NASA
National Aeronautics and
Space Administration

Budget Estimates

FISCAL YEAR 1984

Volume III

Research and Program Management

Special Analyses

CONTENTS

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

FISCAL YEAR 1984 ESTIMATES

VOLUME III

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RESEARCH AND
PROGRAM
MANAGEMENT

SUMMARY
INFORMATION

RESEARCH AND PROGRAM MANAGEMENT

FISCAL YEAR 1984 ESTIMATES

GENERAL STATEMENT

The Research and Program Management appropriation funds the performance and management of research, technology and test activities at NASA installations, and the planning, management and support of the many and varied contractor research and development tasks necessary to meet the Nation's ongoing objectives in aeronautical and space research. Objectives of the efforts funded by the Research and Program Management appropriation are to (1) provide the technical and management capability of the civil service staff needed to conduct the full range of programs for which NASA is responsible, (2) maintain facilities and laboratories in a state of operational capability and manage their use in support of research and development programs, and (3) provide effective and efficient technical and administrative support for the research and development programs. For 1984, an appropriation of $1,247,500,000 is requested.

The 21,219 dedicated civil service personnel at eight major installations and Headquarters are funded by the Research and Program Management appropriation. This civil service workforce is NASA's most important resource and is vital to future space and aeronautics research activities. Seventy percent of the Research and Program Management appropriation is needed to provide for salaries and related costs of this civil service workforce. About two percent is for travel, vital to continue to manage successfully the Agency's in-house and contracted programs. The remaining amount of the Research and Program Management appropriation provides for the research, test and operational facility support, and for related goods and services necessary to operate the NASA installations and to accomplish NASA's approved missions efficiently and effectively.

NASA field centers report to the Program Associate Administrator responsible for the major portion of their technical program. The principal roles of fundamental importance assigned each of the eight NASA installations based on demonstrated capabilities and capacities to meet NASA's overall program goal are as follows:

Office of Space Flight:

Johnson Space Center: Manage the integrated Space Shuttle program, including Orbiter production and operation; astronaut and mission specialist selection and training; STS Operations including mission planning, operational procedures and flight control: and application of remote sensing to agricultural assessments and other Earth resources uses.

Kennedy Space Center: Launch of Space Shuttle flights; the ground operational phase of the Space Transportation System: and the preparation and launch of payloads on the Space Shuttle and expendable launch vehicles.

Marshall Space Flight Center: Manage the Space Shuttle main engine, solid rocket booster and external tank projects; management of NASA's activities on the Spacelab project; management of large automated spacecraft projects such as the Space Telescope: and experiments in materials processing in space.

National Space Technology Laboratories: Support Space Shuttle engine procurement and testing; regional Earth resources research and technology transfer; and support functions for other Government agencies located there.

Office of Space Science and Applications

Goddard Space Flight Center: Develop and operate the Earth orbital flight experiments and automated spacecraft to conduct scientific investigations and demonstrate practical applications; the management of the tracking and data acquisition activities for Earth orbital missions; management of the Delta launch vehicle program; management and launch of sounding rockets and balloons; and operation of an instrumented flight range for aeronautical and space research. The Wallops Facility is an operational element and component installation of the Goddard Space Flight Center.

Office of Aeronautics and Space Technology:

Ames Research Center: Develop short haul aircraft and rotorcraft research and technology, computational fluid dynamics, planetary probe research, life sciences, aeronautical flight research and testing, as well as providing a contingency landing site for Space Shuttle operational missions at the Dryden Flight Research Facility, an operational element and component installation of Ames.

Langley Research Center: Develop long haul aircraft research and technology, emphasizing fuel conservation, safety and environmental effects; aerospace structures technology; environmental quality monitoring by remote sensing; and advanced space systems technology.

Lewis Research Center: Develop and maintain aeronautical and space propulsion research and technology: space communications research and technology: space energy systems research and technology; and development of the Centaur Stage for use in the Space Shuttle and management of the Centaur expendable launch vehicle program.

The 1984 budget provides the necessary resources to apply these in-house capabilities to program activities. Detailed data on funding requirements are provided in the section on each installation. A summary description of, and the funding required by functional category, include:

1. Personnel and Related Costs ($883,785,000): Includes salaries and benefits, including the government's contribution to medicare for NASA permanent and temporary civil service employees, and for personnel of other Government agencies detailed to NASA. This category also includes supporting personnel costs, such as moving expenses (excluding the associated travel of people), recruiting and personnel investigation services provided by the Office of Personnel Management, and the training of NASA civil service employees.

2. Travel ($25,700,000): Includes the cost of transportation, per diem, and related travel expenses of civil service employees who travel for the direction, coordination and management of all NASA program activities including overseas launch and tracking sites; for contract management; for flight mission support: for meetings and technical seminars; and for permanent and temporary relocations. Payments to interagency motor pools are included under Operation of Installation (Management and Operations).

3. Operation of Installation ($338,015,000): Operation of Installation provides a broad range of services, supplies, and equipment in support of each center's institutional activities. These are divided into three major subfunctional areas: Facilities Services, covering the cost of rental of real property, maintaining and repairing institutional facilities and equipment, and the cost of custodial services and utilities; Technical Services, covering the cost of automatic data processing for management activities, and the cost of educational and informational programs and technical shops supporting institutional activities: and Management and Operations, covering the cost of administrative communications, printing, transportation, medical, supply, and related services. The amounts by major subcategory are as follows:

A. <u>Facilities Services ($186,488,000):</u> Includes rental of real property; the cost of maintenance, repair and related activities for facilities and equipment; custodial services; minor modifications and alterations; and utilities services.

B. <u>Technical Services **($59,275,000):**</u> Includes the cost of general purpose automatic data processing for management activities; the dissemination of scientific and technical information derived from the research and development programs; education and informational programs; shops and other. essential technical services.

C. <u>Management and Operations **($92,270,000):**</u> Includes the cost of administrative communications; printing and reproduction; administrative supplies; general purpose materials and equipment; transportation of equipment and supplies (including payments to interagency motor pools); medical services and other support.

SUMMARY OF THE BUDGET PLAN BY FUNCTION

		1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
			(Thousands of Dollars)		
I.	Personnel and Related Costs......	830,255	829,900	876,196	883,785
II.	Travel..........................	19,753	24,100	23,800	25,700
III.	Operation of Installation........	284,047	324,900	299,054	338,015
	A. Facilities Services..........	(145,021)	(179,881)	(164,956)	(186,488)
	B. Technical Services...........	(58,177)	(55,526)	(50,955)	(59,257)
	C. Management and Operations....	(80,849)	(89,493)	(83,143)	(92,270)
IV.	R&PM Appropriation applied to Space Shuttle development.......	48,950	---	---	---
	Total........................	1,183,005	1,178,900	1,199,050	1,247,500

SUMMARY OF CHANGES FROM THE 1983 BUDGET ESTIMATE TO THE 1983 CURRENT ESTIMATE

Of the 1983 Research and Program Management request of $1,178,900,000, $1,168,900,000 has been appropriated. Supplemental appropriations of $30,150,000 are being requested to cover partially the $46,100,000 cost of civil service pay raises in 1983. If that amount is appropriated, the 1983 plan for R&PM will be $1,199,050,000. The changes from the original request are summarized as follows:

(Thousands of Dollars)

1983 Budget Estimate..		$1,178,900
Congressional Action..		-10,000
Appropriated, PL 97-272..		$1,168,900
supplemental Request..		30,150
(Gross cost of 1983 pay increases).....................	(46,200)	
(Absorbed through savings, deferrals, etc. in other costs)......................................	(-16,050)	
1983 Current Estimate..		$1,199,050

The $26.1 million reduction to the 1983 plan (the $10.0 million appropriation reduction and the $16.1 million absorption of increased pay cost) will be accommodated largely through deferring and delaying Research and Program Management expenditures in all functions. The current estimate of the Personnel and Related Costs function will be higher than the budget estimate by the increased pay costs, after increases due to changes in the skill mix and hiring plans are offset by economies in other areas. Reductions in the Travel and Operation of Installation functions will be through the deferral and delay of purchases, and the rephasing of support contractor funding plans. These reductions place a burden on NASA in providing adequate institutional support to the research and development programs; but the actions planned are designed to mitigate any adverse impact as much as possible.

BASIS OF THE 1984 ESTIMATE

The 1984 budget estimate of $1,247,500,000, an increase of $48,450,000 over the 1983 current estimate, provides for the personnel and related costs of 21,219 permanent civil service positions. This reflects a level civil service strength from the 1983 plan, the first time in several years NASA is not planning to reduce its civil service strength in the budget year. The balance of the funds requested will provide a minimum level of travel required to support agency missions; anticipated contractor wage-rates at essentially a level effort; the full year funding of support service contracts; utilities at projected rates; and a constant level of supplies, materials, equipment and other contracts at anticipated price levels. The Research and Program Management appropriation for 1984, by functional category, is summarized as follows:

1. Personnel and Related Costs ($883,785,000): The 1984 estimate for Personnel and Related Costs is based on 21,219 permanent civil service positions. This increase of $7,589,000 results from the combination of the full year effect of 1983 changes, including increased pay costs, and the net effect of 1984 within-grade and career advances and turnover savings.

2. Travel ($25,700,000): The 1984 estimate reflects the same level of travel as planned in 1983 at the expected costs for per diem, air fares and other travel expenses.

3. Operation of Installation ($338,015,000) : The 1984 plan provides about the same level of support to the operations of the various NASA centers as in 1983 at anticipated price levels for 1984. The amounts by subcategory are as follows:

A. Facilities Services ($186,488,000) : The 1984 estimate, an increase of $21,532,000 over the 1983 current estimate, covers anticipated support contractor and utility rate increases, the full year funding of support service contracts, and supplies, materials, and equipment at anticipated 1984 price levels.

B. Technical Services ($59,257,000): The $8,302,000 increase in 1984 covers anticipated contractor rate increases and the full year funding of such contracts, as well as increased costs of supplies, materials and equipment in this subcategory.

C. Management and Operations ($92,270,000): The $9,127,000 increase in this subcategory is needed to provide for the increased costs of supplies, materials and equipment, the anticipated change in support service contract rates, and the full year funding of such contracts.

In summary, the 1984 budget requirement of $1,247,500,000 is to provide for a permanent civil service workforce of 21,219 permanent employees and to support the activities at eight NASA installations and Headquarters, consistent with the research and development and construction of facilities program plans.

DETAIL OF CONTENTS BY FUNCTION

The content of each functional category is explained in greater detail in this section, and the specific requirements for each installation are covered in their respective sections of this volume.

I. PERSONNEL AND RELATED COSTS

A. COMPENSATION AND BENEFITS:

1. Compensation:

a. Permanent Positions: This part of Personnel and Related Costs covers the salaries of the full-time permanent civil service workforce and is the largest part of the functional category. As noted above, the 1984 funds will provide for 21,219 full-time permanent civil service employees.

b. Other Than Full-Time Permanent Positions: This category includes the salaries of NASA's non-permanent workforce. Programs such as students participating in cooperative training, summer employment, youth opportunity, and temporary clerical support are covered in this category.

c. Reimbursable Detailees: In accordance with existing agreements, NASA reimburses the parent Federal organization for the salaries and related costs of persons detailed to NASA.

d. Overtime and Other Compensation: Overtime, holiday, post and night differential, and hazardous duty pay are included in this category. Also included are incentive awards for outstanding achievement and superior performance awards.

2. Benefits: In addition to compensation, NASA makes an employer's contribution to personnel benefits as authorized and required by law. These benefits include contributions to the Civil Service Retirement Fund, employees' life and health insurance, and social security contributions for non-permanent personnel. Payments for severance pay are made to former employees involuntarily separated through no fault of their own. Beginning in 1983, the cost of NASA's matching contribution for Medicare is included.

B. SUPPORTING COSTS:

1. Transfer of Personnel: Relocation costs, such as the expenses of selling and buying a home, and the movement and storage of household goods are provided under this category.

2. Office of Personnel Management Services: The Office of Personnel Management is reimbursed for certain activities such as security investigations on new hires, recruitment advertising, and career-maturity surveys.

3. Personnel Training: Training is provided within the framework of the Government Employees Training Act of 1958. Part of the training costs consist of courses offered by other Government agencies, and the remainder provides for training through nongovernment sources.

11. TRAVEL

A. Program Travel:

The larsest part of travel is for direction, coordination and management of program activities including International programs and activities. The complexity of the programs involved and the geographical distribution of NASA installations and contractors throughout the entire United States impose the requirement for this category of travel. As projects reach the flight stage, support is required for prelaunch activities, including overseas travel to launch and tracking sites. The amount of travel required for flight projects is significant as it is directly related to the number of systems and subsystems, the number of design reviews, and the number and complexity of the launches and associated ground operations.

B. Scientific and Technical Development Travel:

Travel to scientific and technical meetings and seminars permits employees engaged in research and development to participate at both Government-sponsored and nongovernment-sponsored seminars. This participation allows personnel to benefit from exposure to technological advances which arise outside NASA, as well as allowing personnel to present both accomplishments and problems to their associates and provide for the dissemination of technical results to the U.S. community. Many of the Government-sponsored meetings are working panels convened to solve certain problems for the benefit of the Government.

C. Management and Operations Travel:

Management and operations travel includes travel for the direction and coordination of general management matters and travel by officials to review the status of programs. It includes travel by functional managers in such areas as personnel, financial management and procurement. This category also includes the cost of travel in and around the Installations; travel of unpaid members of research advisory committees; and initial duty station, permanent change of assignment, and other family travel expenses. Payments to interagency motor pools are included in the Operation of Installation function (Management and Operations subfunction).

111. OPERATION OF INSTALLATION

Operation of Installation provides a broad range of services, supplies, and equipment in support of the centers' institutional activities. These are divided into three major subfunctional areas: Facilities Services (the cost of renting real property, maintaining and repairing institutional facilities and equipment, and the cost of custodial services and utilities); Technical Services (the cost of automatic data processing for management activities, and the cost of educational and information programs and technical shops supporting institutional activities); and Management and Operations (the cost of administrative communications, printing, transportation, medical, supply, and related services). A description of each major subfunction follows:

A. Facilities Services:

1. Rental of Real Property: Rental of real property includes the rental of building space directly by NASA or through the General Services Administration to meet offsite office, warehousing, and other requirements which cannot otherwise be provided in existing buildings at the NASA Installation. Most of the funding is required for rental of the NASA Headquarters complex of buildings in the District of Columbia, and nearby Maryland and Virginia that are either Government-owned or leased for which NASA must provide rental payments to the General Services Administration in accordance with P.L. 92-313. Also included in this item is rental of trailers required to accommodate special short-term needs.

2. Maintenance and Related Activities: Maintenance and related activities includes the recurring day-to-day maintenance of facilities (ground, buildings, structures, etc.) and equipment which is accomplished by non-Civil Service personnel. This involves the mowing and care of grassy areas, care of trees and shrubs, elevators, cranes, pressure vessel inspections, painting and

protective coatings, general buildings maintenance, and the maintenance of installed mechanical, electrical, and other systems. In addition, this item includes feasibility studies, project design, construction supervision, inspection, and other institutional facility engineering functions. Included also are any applicable costs associated with recurring facility work as well as materials, hardware, and equipment used in facility maintenance activities, whether accomplished by civil service personnel or contractors. In the cost of equipment, related maintenance and other services are reflected for office, shop, laboratory and other facilities equipment as well as administrative internal communications and television monitoring equipment.

3. Custodial Services: Custodial services include janitorial and building cleaning services, pest control, fire protection services, security services including badging and identification, lock and safe repair , trash and refuse handling, window blinds and light fixture cleaning, and laundry and dry cleaning of facility related items.

4. Utilities Services: Utilities services include the purchase of utilities such as electricity, natural gas, fuel oil, coal, steam, propane, and other fuel commodities as well as water and sewage treatment services. Also included are the related maintenance and operating costs of the utility plants and systems.

B. Technical Services:

1. Automatic Data Processing:

a. Equipment: This category provides for the lease, purchase and maintenance of general purpose data processing equipment which supports institutional operations at each installation. Excluded is equipment dedicated to specific research or operational systems which is funded from the Research and Development appropriation.

b. Operations: Operations services include programming, computer operations and related services for institutional applications including payroll, financial management, security, maintenance, personnel, logistics, and procurement records and reports.

2. Scientific and Technical Information and Educational Programs:

a. Libraries: The technical libraries are established to provide installation staffs with books, periodicals, technical reports and other documentation.

b. Education and Information Programs: The educational and informational programs provide for the documentation and dissemination of information about the Agency's programs to the general public, the educational community at the elementary and secondary levels, and the mass communications media. Assistance to the mass communications media includes the assembly and exposition of newsworthy material in support of requests in the form of press kits, news releases, television and radio information tapes and clips, and feature material.

c. Shop and Support Services: Shop and support services include general fabrication shops, reliability and quality assurance activities, safety, photographic services, graphics, and audio-visual material.

C. Management and Operations:

1. Administrative Communications: Included in this category are costs of leased lines not dedicated to a specific program or project, long distance tolls, teletype services, and local telephone service.

2. Printing and Reproduction: Included in this category are the costs for duplicating, blueprinting, microfilming, and other photographic reproductions. Also included in this category are Government Printing Office printing costs, contractual printing and the related composition and binding operations.

3. Transportation: Transportation services include the operation and maintenance of all general purpose motor vehicles used by both civil service and support contractor personnel. The cost of movement of supplies and equipment by commercial carriers and payments to interagency motor pools are also in this category.

4. Installation Common Services: Installation common services include support activities at each installation such as: occupational medicine and environmental health; mail service; supply management; patent services; administrative equipment; office supplies and materials; and postage.

TRIB TION OF PERMANENT CIVIL BY INSTALLATION

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
Johnson Space Center	3.346	3.293	3.293	3.293
Kennedy Space Center	2.133	2.112	2.112	2.112
Marshall Space Flight Center	3.351	3.285	3.285	3.285
National Space Technology Laboratories	104	104	104	104
Goddard Space Flight Center	3.661	3.623	3.623	3.623
Ames Research Center	2.037	2.021	2.021	2.021
Langley Research Center	2.866	2.845	2.845	2.845
Lewis Research Center	2.663	2.479	2.479	2.479
Headquarters	1.491	1.457	1.457	1.457
Total. Permanent Civil Service	21.652	21.219	21.219	21.219

SUMMARY OF BUDGET PLAN BY INSTALLATION
(Thousands of Dollars)

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
Johnson Space Center	186.490	192.396	195.193	204.616
Kennedy Space Center	155.958	169.500	163.341	173.472
Marshall Space Flight Center	172.059	177.704	183.952	186.663
National Space Technology Laboratories	6.604	6.252	6.332	9.302
Goddard Space Flight Center	169.132	173.638	180.865	183.726
Ames Research Center	101.054	104.893	107.374	108.835
Langley Research Center	126.591	131.303	134.189	139.081
Lewis Research Center	106.412	110.591	115.920	121.857
Headquarters	109.755	112.623	111.884	119.948
R&PM applied to Space Shuttle development	48.950	---	---	---
Total	1.183.005	1.178.900	1.199.050	1.247.500

DISTRIBUTION OF PERMANENT CIVIL SERVICE BY PROGRAM

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
SPACE TRANSPORTATION SYSTEM	6,328	6,164	6,080	6,045
space transportation capability development	5,148	2,880	3,201	2,886
Space transportation operations	1,180	3,284	2,879	3,159
SPACE SCIENCE AND APPLICATIONS	4,066	4,026	4,096	4,187
Physics and astronomy	1,957	1,942	1,996	2,071
Life sciences	264	263	271	269
Planetary exploration	202	205	190	188
Space applications	1,643	1,616	1,639	1,659
TECHNOLOGY UTILIZATION	50	45	48	46
AERONAUTICS AND SPACE TECHNOLOGY	5,319	5,158	5,179	5,152
Aeronautical research and technology	3,753	3,764	3,739	3,740
Space research and technology	1,369	1,394	1,400	1,412
Energy technology	197	---	40	---
TRACKING AND DATA ACQUISITION	780	792	781	790
Subtotal. Direct Positions	16,543	16,185	16,184	16,220
CENTER MANAGEMENT AND OPERATIONS SUPPORT	5,109	5,034	5,035	4,999
Total. Permanent Positions	21,652	21,219	21,219	21,219

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

FISCAL YEAR 1984 ESTIMATES
RESEARCH AND PROGRAM MANAGEMENT
DISTRIBUTION OF BUDGET PLAN BY FUNCTION BY INSTALLATION
(Thousands of Dollars)

FUNCTION	Total NASA	Johnson Space Center	Kennedy Space Center	Marshall Space Flight Center	National Space Technology Laboratories	Goddard Space Flight Center	Ames Research Center	Langley Research Center	Lewis Research Center	Eeadquarters
Personnel and Related Costs										
1982 Actual	830,255	138,745	82,752	132,480	3,984	137,446	77,916	101,234	88,678	67,020
1983 Budget..........	829,900	137,479	83,431	132,529	4,020	135,950	78,391	100,654	89,086	68,360
1983 Current.........	876,196	144,305	87,292	139,352	4,474	144,635	81,759	107,436	94,764	72,179
1984 Estimate........	883,785	145,648	88,408	139,103	4,489	144,464	81,957	108,351	98,009	73,356
Travel										
1982 Actual	19,753	3,806	1,258	2,942	123	3,070	1,929	1,984	1,364	3,277
1983 Budget..........	24,100	4,709	1,687	3,413	147	3,684	2,109	2,536	1,545	4,270
1983 Current.........	23,800	4,486	1,841	3,481	142	3,600	2,158	2,185	1,757	4,150
1984 Estimate	25,700	4,773	2,063	3,720	151	3,885	2,212	2,325	2,086	4.485
Operation of Installation										
1982 Actual..........	284,047	43,939	71,948	36,637	2,497	28,616	21,209	23,373	16,370	39,458
1983 Budget.........	324,900	50,208	84,382	41,762	2,085	34,004	24,393	28,113	19,960	39,993
1983 Current.........	299,054	46,402	74,208	41,119	1,716	32,630	23,457	24,568	19,399	35,555
1984 Estimate	338,015	54,195	83,001	43,840	4,662	35,377	24,666	28,405	21,762	42,107
TOTAL										
1982 Actual*	1,134,055	186,490	155,958	172,059	6,604	169,132	101,054	126,591	106,412	109,755
1983 Budget..........	1,178,900	192,396	169,500	177,704	6,252	173,638	104,893	131,303	110,591	112,623
1983 Current	1,199,050	195,193	163,341	183,952	6,332	180,865	107,374	134,189	115,920	111,884
1984 Estimate........	1,247,500	204,616	173,472	186,663	9,302	183,726	108,835	199,081	121,857	119,948

'Total excludes $48,950,000 of FY 1982 R&PM applied to Space Shuttle development.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

PROPOSED APPROPRIATION LANGUAGE

RESEARCH AND PROGRAM MANAGEMENT

For necessary expenses of research in government laboratories, management of programs and other activities of the National Aeronautics and Space Administration, not otherwise provided for, including uniforms or allowances therefor, as authorized by law (5 U.S.C. 5901–5902); awards; [purchase (for replacement only, of two aircraft, for which partial payment may be made by exchange of at least one existing administrative aircraft and such other existing aircraft as may be considered appropriate),] *lease,* hire, maintenance and operation of administrative aircraft; purchase (not to exceed [seventeen] *twenty-seven* for replacement only) and hire of passenger motor vehicles; and maintenance and repair of real and personal property, and not in excess of $75,000 per project for construction of new facilities and additions to existing facilities, repairs, and rehabilitation and modification of facilities; [$1,168,900,000] *$1,247,500,000* : *Provided,* That contracts may be entered into under this appropriation for maintenance and operation of facilities, and for other services, to be provided during the next fiscal year *Provided further,* That not to exceed [$25,000] *$35,000* of the foregoing amount shall be available for scientific consultations or extraordinary expense, to be expended upon the approval or authority of the Administrator and his determination shall be final and conclusive. *(42 U.S.C. 2451, et seq.; Department of Housing and Urban Development—Independent Agencies Appropriation Act, 1983; additional authorizing legislation to be proposed.)*

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

RESEARCH AND PROGRAM MANAGEMENT

PROGRAM AND FINANCING
(in thousands of dollars)

Identification code 80-0103-0-1-999	Budget plan 1982 actual	Budget plan 1983 estimate	Budget plan 1984 estimate	Costs and obligations 1982 actual	Costs and obligations 1983 estimate	Costs and obligations 1984 estimate
Program by activities:						
Direct program:						
1. Space transportation systems	476.374	489.850	509.700	476.298	489.929	509.700
2. Scientific investigations in space	175.928	189.600	202.300	170.050	189.600	202.300
3. Space and terrestrial applications	105.725	112.500	115.000	111.499	112.500	115.000
4. Space research and technology	84.089	95.100	98.700	84.068	95.100	98.700
5. Aeronautical research and technology	228.872	252.700	265.100	228.806	252.700	265.100
6. Energy technology	10.843	2.800	---	10.840	2.800	---
7. Supporting activity	52.519	56.500	56.700	52.494	56.500	56.700
Subtotal direct program	1.134.350	1,199,050	1.247.500	1.134.055	1,199,129	1.247.500
Program funded for R&D	48.950	---	---	48.950	---	---
Program funded in this account	1.183.300	1.199.050	1.247.500	1.183.005	1.199.129	1.247.500
Reimbursable program:						
1. Space transportation systems	22.564	24.600	24.600	22.564	24.600	24.600
2. Scientific investigations in space	115	130	130	115	130	130
3. Space and terrestrial applications	6.184	6.800	6.800	6.184	6.800	6.800
4. Space research and technology	14	20	20	14	20	20
5. Aeronautical research and technology	403	450	450	403	450	450
6. Energy technology	16.518	18.000	18.000	16.518	18.000	18.000
Total reimbursable program	45.798	50.000	50.000	45.798	50.000	50.000
10.00 Total obligations	1.229.098	1.249.050	1.297.500	1.228.803	1,249,129	1.297.500

Identification code 80-0103-0-1-999	Budget plan 1982 actual	1983 estimate	1984 estimate	Costs and obligations 1982 actual	1983 estimate	1984 estimate
Financing:						
Offsetting collections from:						
11.00 Federal funds				-25,215	-27,500	-27,500
14.00 Non-Federal sources				-20,583	-22,500	-22,500
21.40 Unobligated balance, start of year				---	-79	---
24.40 Unobligated balance, end of year				79	---	---
25.00 Unobligated balance lapsing				216	---	---
39.00 **Budget authority**				**1,183,300**	**1,199,050**	**1,247,500**
Budget authority:						
40.00 Appropriation				**1,183,300**	**1,168,900**	**1,247,500**
44.20 **Supplemental for civilian pay raises**				—	**30,150**	---
Relation of obligations to outlays:						
71.00 Obligations incurred, net				1,183,005	1,199,129	1,247,500
72.40 Obligated balance, start of year				83,081	133,266	82,395
74.40 Obligated balance, end of year				-132,266	-82,395	-82,395
77.00 Adjustments in expired accounts				-2,801	---	---
99.00 Outlays, excluding pay raise supplemental				1,130,019	1,219,850	1,247,500
91.20 Outlays from civilian pay raise supplemental				---	30,150	---

INSTALLATION
JUSTIFICATION

JOHNSON
SPACE CENTER

RESEARCH AND PROGRAM MANAGEMENT

FISCAL YEAR 1984 ESTIMATES

LYNDON B. JOHNSON SPACE CENTER

DESCRIPTION

The Lyndon B. Johnson Space Center (JSC) is located approximately 20 miles southeast of downtown Houston, Texas. Total NASA-owned land at the Houston site consists of 1,620 acres. The Center also utilizes an additional 54,080 acres at the White Sands Test Facility, Las Cruces, New Mexico, and a portion of Ellington AFB, Texas, 8 miles northwest of the Center. The total capital investment of the Lyndon B. Johnson Space Center, including fixed assets in progress and contractor-held facilities at various locations and the White Sands Test Facility, as of September 30, 1982 was $909,840,000.

CENTER ROLES AND MISSIONS

The Johnson Space Center was established in November 1961, in response to the need for NASA to designate a primary Center to manage the design, development and manufacture of manned spacecraft; for selection and training of astronaut crews; and the conduct of manned space flight missions. This need continued as the Nation proceeded toward more ambitious undertakings such as the Apollo program, the Skylab program, the Apollo-Soyuz Test Project and the current Space Transportation System program. To meet this responsibility, JSC has developed unique areas of recognized technical excellence within the civil service staff and facilities of superior merit; that is, major technical facilities which constitute a National resource. The principal and supporting roles are:

PRINCIPAL

Manned Vehicles - development of manned space vehicles and associated supporting technology, including:

Space Shuttle - develop the Orbiter and lead Center for management of the Space Shuttle system. Provide sustaining engineering and logistic support for Space Transportation System (STS) hardware. Includes Space Shuttle configuration management, Space Shuttle sustaining engineering and Orbiter operations procurement.

Environmental and Crew Support Systems - develop and demonstrate Environmental Control and Life ;pport Subsystems (EC/LSS) and Extravehicular Activity (EVA) systems suitable for the Space ransportation Systems and other advanced needs.

Food Systems Technology - develop nutritional requirements and food processing systems in support of human space flight.

Environmental Effects Analysis - manage efforts to develop the data base and conduct analyses to ascertain any environmental impact of STS operations.

Supporting Technology Advanced Developments - develop prototypes, long lead time systems and new procedures and software for advanced systems.

Advanced Missions - focus is on studies to define advanced transportation, orbital systems, and a permanent manned space station.

STS Operations - operational planning, crew selection and training, medical operations, and Space Transportation System flight control.

Life Sciences:

Medical Research - establish human baseline data, investigate and develop countermeasures to solve space medicine problems, and develop information techniques and equipment to support medical operation and medical experiments.

Spacelab Payload - develop Life Sciences Spacelab research capability through common operating research equipment development. Define and develop in-flight biomedical experiments.

Lunar and Planetary Geosciences - develop and maintain technical discipline base for lunar and planetary geosciences and planetary materials handling techniques.

Earth Observations - provide a discipline base for Earth observations applications, including airborne experiments and space-based flight sensors. Current emphasis includes the application of Landsat and other data to agricultural crop forecasting.

Payload Operations and Support Equipment - analyze payload mission requirements and planning; develop multi-mission payload support equipment.

SUPPORTING

Technology Experiments in Space - manage Orbiter experiments program. Define and develop experiments in areas consistent with other JSC space roles.

SUMMARY OF RESOURCES REQUIREMENTS

Funding Plan By Function

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
	(Thousands of Dollars)			
I. Personnel and Related Costs.................	138,745	137,479	144,305	145,648
II. Travel.....................................	3,806	4,709	4,486	4,773
111. Operation of Installation..................	43,939	50,208	46,402	54,195
A. Facilities Services....................	(22,755)	(27,093)	(24,677)	(28,177)
B. Technical Services......................	(6,646)	(6,492)	(5,699)	(7,728)
C. Management and Operations.......	(14,538)	(16,623)	(16,026)	(18,290)
Total, fund requirements.	186,490	192,396	195,193	204,616

Distribution of Permanent Positions by Program

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
Direct Positions				
Space Transportation Systems	2,553	2,456	2.491	2,491
Space transportation capability development	2,083	1,383	1,502	1,432
Space transportation operations	470	1,073	989	1,059
Space Science and Applications	222	267	230	230
Physics and astronomy	15	15	10	11
Life sciences	97	114	97	97
Planetary exploration	22	38	27	26
Space applications	88	100	96	96
Technology utilization	3	4	4	4
Aeronautics and Space Technology	38	30	39	39
Aeronautical research and technology	5	5	5	5
Space research and technology	33	25	34	34
Subtotal. direct positions	2,816	2,757	2,764	2,764
Center Management and Operations Support	530	536	529	529
Total. permanent positions	3,346	3,293	3,293	3,293

PROGRAM DESCRIPTION

	Permanent Positions (Civil Service)
SPACE TRANSPORTATION CAPABILITY DEVELOPMENT..	1,432

The 1984 staffing provides for continuation of the Space Shuttle production activities to support a schedule consistent with the major program milestones. It also provides development, integration, and operations support for the Mission Control Center (MCC), Payload Operations Control Center (POCC), Upper Stages, and specific payload requirements for optional services.

Activities consistent with a phased delivery of the total Orbiter fleet, and procurement of necessary initial flight and ground support equipment will be continued. The JSC Space Shuttle Program Office has program management responsibility for program control, overall systems engineering, and Space Shuttle systems integration, providing management of the lead Center functions as related to the Space Shuttle program and the overall systems management and integration of all elements of the program. The Space Shuttle Orbiter Project Office provides overall management of the production of the Orbiter system. This includes management of various elements of the total Orbiter system; e.g., structures, propulsion, power, and avionics, and lower elements within the subsystem.

To integrate all vehicle systems into an efficient operating system, many detailed interfaces and functional performance features must be identified and defined. Specific interface control documents are identified and established, including both flight systems and the flight to ground system. General capability and performance criteria are established for special areas of consideration such as electro-magnetic compatibility and lightning protection. Systems operations require the preparation of systems performance data and operational information.

In addition to major Space Shuttle flight system elements individually managed through Space Shuttle project offices, other JSC elements supply large quantities of supporting equipment to the program. Examples of such equipment are: Extravehicular mobility unit, portable oxygen system, closed circuit television, survival radio sets, dosimeter crew equipment, photographic camera systems, bioinstrumentation and remote manipulator system (RMS).

Since the Orbiter represents an integrated complex of technical and engineering disiciplines, specific subtasks have been assigned to a variety of technical organizations at JSC. Included in these tasks are: providing technical expertise in the Orbiter life support systems; performing engineering analysis and performance evaluation for communication and tracking systems ground testing; providing expertise in guidance , navigation , control, instrumentation and electrical power distribution; management and operation of environmental test chamber; analysis and evaluation of the Orbiter hydraulics system, auxiliary power unit, orbital manuevering system components, reaction control engine performance, and reaction control system engine valve leak detection techniques; analysis vehicle attachment and separation systems: analysis of total Space Shuttle systems, Space Shuttle/payload interface, crew station evaluation, and Space Shuttle airlock evaluation; and engineering analysis to determine overall vehicle performance characteristics in the area of aerodynamic performance, flight characteristics, performance, and dynamics including aeroelasticity.

The successful flight and operational performance of the Space Shuttle is dependent on the proper functioning of integrated electronic equipment. Collectively, these are termed the Integrated Avionics System. Avionics provide the Space Shuttle pilots and crew with the total assessment and command capability necessary to manage, fly, and operate the vehicle. Because of the critical nature of this system, very close attention is given to the identification of performance requirements and integrated performance.

A variety of avionic elements are included within the Space Shuttle system, each of which requires the attention of a group of technical experts. These elements include: guidance, navigation and control, data processing, communication and tracking, instrumentation , displays and control, solid rocket booster control and recovery interface, power and control, and external tank propellant control and instrumentation.

The MCC is being upgraded to provide the ability to separate a secure data string for Department of Defense Shuttle mission support. The POCC will be augmented to provide command and control support for attached payload flights.

support of the Spacelab development effort includes establishing and controlling Space Shuttle interface with the Spacelab, for overall safety requirements for the Space Shuttle/Spacelab, and support of the Marshall Space Flight Center in the performance of its assigned responsibilities. JSC is responsible for crew mission training in conjunction with flight hardware and the development and operation of Space Shuttle/Spacelab simulators and trainers, as well as Spacelab support residing in the orbiter general purpose computer.

Orbiter avionics software development in the STS Operations era will provide for payload support. This will include general capabilities for Spacelab, and Upper Stages, with flexibility available to implement specific payload requirements as optional services.

The Advanced Programs activities at JSC are planned and administered in a manner designed to support future agency programs. The Center conducts in-house and contracted activities at both the major systems and support technology level. Major systems studies are designed to identify total system concepts including requirements, implementation methods, and programmatic analysis. Supporting technology activities are conducted to insure readiness of the advanced sub-systems necessary for implementation of advanced programs. Major emphasis at JSC Over the past several years has been on satellite services to improve utilization of the Orbiter and on studies of a permanently manned Space station. In the Space Station area, attention will be given to the definition of mission requirements and technology.

	Permanent Positions (Civil Service)
SPACE TRANSPORTATION OPERATIONS..	1,059

Space Transportation Operations staffing provides for Space Shuttle operational flight program management including vehicle system integration; MCC operations; crew equipment and crew training; and flight and mission planning and operations.

Mission Flight Support includes a wide variety of planning activities ranging from operational concepts and techniques to detailed systems operational procedures and checklists. Tasks include preparation of development system and software handbooks, flight rules, detailed crew activity plans and procedures, development of mission control center and network systems requirements, and operations input to the planning for the selection and operation of Space Shuttle payloads.

Operations flight design includes: the identification of operational requirements for the design of planned and improved spacecraft systems; the development of flight techniques for utilization of these systems; the development of nominal and contingency flight profiles for all Space Shuttle missions; and the investigation of flight anomalies and their corrective action. This includes conceptual level profile development and analysis, beginning about two years before the flight, and operational profile development and analysis, accomplished immediately prior to the flight. As in orbital flight testing, the software activities for operational flights also include the continued development, definition, and verification support of the guidance, targeting, and navigation systems software requirements in the Orbiter and MCC. Software changes for Orbiter improvements will upgrade vehicle capabilities and the performance envelope.

Specific flight planning activity encompasses the flight design, flight analysis, and software activities. The flight design tasks include supporting the crew training simulations and development of flight techniques. Flight design products include conceptual flight profiles and operational flight profiles which are issued for each flight. The software activities include the development, formulation, and verification support for the guidance, targeting, and navigation systems software requirements in the orbiter and MCC.

Avionics and software testing and checkout in the Electronics Systems' Test Laboratory and the Space Shuttle Avionics Integration Laboratory continue to be conducted in the operations era. The purpose of these laboratories is to verify the functional performance of the Space Shuttle Integrated Avionics Systems, validate the system design, and verify compatibility of the various radio frequency communications links.

Reconfiguration tools (hardware and software system) to permit support of the high flight rate of the 1980's will be implemented in the Space Shuttle Mission Simulator complex and procedures training facility. The capability for near-continuous training of a number of flight crews for different types of missions with different payload requirements and on different Orbiters will require management and utilization of a very high volume of data. Therefore, automated tools are essential to support this magnitude of training. In addition, simulator system upgrades will be made to match changes made to the Orbiters.

Furthermore, there is provision for rapid handling of mission-to-mission software changes (flight dependent data in erasable memory) and associated verification on a production line basis because of the greater mission rates. To accommodate the production-line type of work, emphasis is being placed on software tools and the associated automatic data processing equipment hardware which now comprise the Software Development Laboratory and the transition of support into a Software Production Facility.

PHYSICS AND ASTRONOMY.. 11

JSC is assigned mission management responsibilities for the Earth-looking remote sensing mission OSTA-3, **OSTA-5,** and OSTA-7. These responsibilities include the mission planning, real time mission control, mission requirements definition, and experiment integration. The Center will also have mission management responsibility for dedicated Life Sciences Spacelab missions.

LIFE SCIENCES.. 97

The Center has the lead role in evaluating human physiological changes associated with the space environment and providing effective countermeasures to assure crew health and optimal performance. The scientific activities are to define and develop biomedical experiments for life sciences payloads. These experiments are also designed to utilize the space environment to accomplish medical and biological research.

The medical activities provide for medical contingencies in flight involving onboard health services, training for crewman, ground-based medical support, and medical evaluation of proposed crew members. The objectives are supportive of the Center's responsibility for assuring astronaut health and safety, both during flight and on the ground. The accomplishment of these objectives requires a well defined and continuing program that incorporates medical research, operations, laboratory support, and clinical medicine.

The bioengineering activities include dedicated Life Sciences Spacelab experiments and integration for human experiments. To this end, science experiments have been selected, and experiment hardware development has been initiated. JSC has mission management responsibility for the life sciences payloads, which includes systems management and engineering of the payload equipment and operation of the payload during flight.

PLANETARY EXPLORATION.. 26

The Center provides a strong, active research group to support future program, curatorial support, and assistance in information dissemination and interaction with outside scientists. To provide this support, the research group must make an active contribution to our knowledge of the compositions, structures and evolutionary histories of the solid bodies of the solar system. Therefore, the Center has an ongoing program of analysis of planetary materials and of remote sensing data, a theoretical studies program and a program which is involved in the development of remote sensing instrumentation. The definition of geoscience requirements for future planetary flight missions is an important role for the geoscience group which is involved in extensive interaction with the planetary science community.

	Permanent Positions (Civil Service)
SPACE APPLICATIONS	**96**

The Earth observations discipline is divided into two major areas: technology development and applications projects and flight projects. JSC's responsibility entails the conduct and implementation of major tasks in each of these areas.

Technology development and applications projects use remotely-sensed data for agricultural crop identification, crop acreage and yield estimation, forest mapping and inventory, soil moisture measurement, and vegetation cover monitoring. Studies of data systems and techniques associated with these and other applications are also being conducted.

Flight projects responsibilities at JSC include airborne instrumentation and Shuttle payload instrument development. The Large Format Stereo Camera is being developed by JSC for flight on the Space Shuttle. Responding to airborne measurement requirements, JSC is developing and implementing an aircraft sensors plan which involves the testing, maintenance, and operation of a wide variety of remote sensors to provide data to investigators.

TECHNOLOGY UTILIZATION	4

The technology utilization program transfers new knowledge and innovative technology resulting from NASA's research and development programs for application to industry, medicine, and the public sector. The Technical Planning Office at JSC provides program office direction for the technology utilization program and initiates engineering support to analyze the feasibility of applying space technology to ground-based operations, i.e., telecare, feeding the elderly, and the bioisolation garment. This analysis assures the effective dissemination of this data to other government agencies, and industrial and research concerns who can further improve, develop, and market the product.

	Permanent Positions (Civil Service)
AERONAUTICAL RESEARCH AND TECHNOLOGY..	5

JSC is continuing its efforts in the fire testing of aircraft interior panels fabricated with newly developed materials. This project provides the aircraft industry with test data and results of flammability tests on interior cabin components based on full-scale fire testing. In addition, JSC is investigating the toxicity of the thermodecomposition (pyrolysis) products of several candidate aircraft/spacecraft materials.

SPACE RESEARCH AND TECHNOLOGY..	34

Systems and design studies are being performed to: develop technology, fabricate, and test components of a Synthetic Aperture Imaging Radar (SAIR); research fuel cell and electrolysis cell technology to demonstrate suitability to large orbital energy conversion and storage requirements; collect data (using the Space Shuttle Development Flight Instrumentation) that will augment the research and technology base for future transportation systems design; collect and analyze flight mechanics data for the determination of aerodynamic coefficients from Orbiter flight data; develop automation technology applicable to Space Transportation System; develop berthing/docking systems technology required for future large space systems; and design, fabricate, and test advanced thermal protection systems.

CENTER MANAGEMENT AND OPERATIONS SUPPORT..	529

Center Management and Operations Support provides support to all JSC organizations which cannot be identified exclusively to a single program or project. The civil service personnel involved in this support include the following:

Director and Staff - The Center Director, Deputy Director and immediate staff; e.g, Legal, Patent Counsel, Equal Opportunity, Technical Planning, and Public Affairs.

Management Support - The part of the JSC civil service workforce who provide information and control service supporting all levels of Center management, both program and functional. Specific functions include resources and financial management, program control, contracting and procurement, property management, personnel management, and management systems and analysis.

Operations Support - The part of the JSC civil service workforce who provide for the operation and maintenance of institutional facilities, buildings, systems, and equipment, including those who manage or provide technical services such as automatic data processing, reliability and quality assurance, medical care, and photographic support.

RESOURCE REQUIREMENTS BY FUNCTION

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of Dollars)		
I. PERSONNEL AND RELATED COSTS	138,745	137,479	144,305	145,648

Summary of Fund Requirements

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
A. Compensation and Benefits				
1. Compensation				
a. Permanent positions	119,097	117,546	122,249	122,637
b. Other than full-time permanent positions	2,286	2,585	2,601	2,622
c. Reimbursable detailees	3,136	3,386	3,304	3,400
d. Overtime and other compensation	1,329	839	1,284	1,385
Subtotal, Compensation	125,848	124,356	129,438	130,044
2. Benefits	11,991	12,263	13,938	14,684
Subtotal, Compensation and Benefits	137,839	136,619	143,376	144,728
B. Supporting Costs				
1. Transfer of personnel	148	250	250	250
2. Personnel training	758	610	679	670
Subtotal, Supporting Costs	906	860	929	920
Total, Personnel and Related Costs	138,745	137,479	144,305	145,648

Explanation of Fund Requirements

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of Dollars)		
A. Compensation and Benefits......................	137,839	136,619	143,376	144,728
1. Compensation	125,848	124,356	129,438	130,044
a. Permanent positions.	119,097	117,546	122,249	122,637

The current estimate for 1983 reflects a change from the 1983 budget estimate due to the recent pay increases.

Basis of Cost for Permanent Positions

In 1984, the cost of permanent positions will be $122,637,000, an increase of $388,000 from 1983. The increase is calculated as follows:

Cost of permament positions in 1983...		122,249
Cost increases in 1984..		+2,910
Within grade and career advances:		
Full year effect of 1983 actions.......................	+1,229	
Partial year effect of 1984 actions....................	+1,503	
Full year effect of 1983 pay increases...................	+178	
Cost decreases in 1984..		-2,522
Turnover savings and abolished positions:		
Full year effect of 1983 actions.......................	-770	
Partial year effect of 1984 actions....................	-872	
One less paid day in 1984................................	-471	
Alteration in the method of calculation of salaries paid (PL 97-253)..	-409	
Cost of permanent positions in 1984.........................		122,637

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
	(Thousands of Dollars)			
b. Other than full-time permanent positions				
1. cost..............................	2,286	2,585	2,601	2,622
2. Workyears	188	208	194	194

The distribution of 1984 workyears is as follows:

Distribution of Other than Full-Time Permanent Workyears

Program	Workyears
Developmental programs..	93
Summer employment progra~...	10
Youth opportunity programs..	45
Other temporary progra~..	46
Total..	194

The increase from the 1983 budget estimate to the 1983 current estimate reflects the effect of the pay raise offset by changes in the skill mix. The increase in 1984 is the full year effect of the skill mix changes.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
c. Reimbursable detailees..................	3,136	3,386	3,304	3,400

The military personnel detailed to the Johnson Space Center on a reimbursable basis are individuals experienced in manned space flight and related fields. Each individual performs a function essential and critical to current and future programs. The decrease from the 1983 budget estimate to the 1983 current estimate is due to a reduction in number of on-board military detailees partially offset by pay increases. The increase in the 1984 estimate is due to the replacement of personnel reduced in 1983.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of Dollars)		
d. Overtime and other compensation..........	1,329	839	1,284	1,385

Overtime is used primarily in support of the Space Shuttle operational flights; e.g., crew training, trajectory optimization, data reduction integration laboratory, and related support activities. The increase from the 1983 budget estimate to the 1983 current estimate is a higher level of awards than previously planned. The increase in 1984 is overtime and is based on additional Shuttle missions.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
2. Benefits....................................	11,991	12,263	13,938	14,684

The following are the amounts of contribution by category:

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
Civil Service Retirement Fund..	8,397	8,374	8,674	8,778
Employee life insurance..................	340	393	356	362
Employee health insurance................	2,660	2,455	3,315	3,557
Workmen's compensation....	404	771	464	600
FICA.....................................	57	53	63	70
Medicare..................................	---	---	1,056	1,307
Other benefits...........................	133	217	10	10
Total....................................	11,991	12,263	13,938	14,684

The increase from the 1983 budget estimate to the 1983 current estimate is due primarily to increased health benefits including Medicare, and the recent pay increases. The workmen's compensation estimates for 1983 and 1984 are estimates based on Department of Labor billings. The increase from 1983 to 1984 is primarily due to a full year cost of health benefits and the 1982 pay increases.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of Dollars)		
B. Supporting Costs	906	860	929	920
1. Transfer of personnel	148	250	250	250

Transfer of personnel costs, include movement of household goods, subsistence and temporary expenses, real estate and miscellaneous moving expenses related to permanent changes of employees duty stations. The increase in the 1983 current estimate budget over the 1982 is an increased number of relocations more consistent with current hiring plans.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
2. Personnel training	758	610	679	670

The purpose of the JSC training program is to continue the development of skills and knowledge of civil service employees in order to more efficiently support JSC roles and missions. The increase from the 1983 budget estimate to the 1983 current estimate reflects the impact of the changing activities at the Center.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of Dollars)		
II. **TRAVEL**..	3,806	4,709	4,486	4,773

Summary of Fund Requirements

A. Program Travel................................	3,412	4,309	4,053	4,312
B. Scientific and Technical Development Travel.....	194	153	208	221
C. Management and Operations Travel...............	200	247	225	240
Total, Travel................................	3,806	4,709	4,486	4,773

Explanation of Fund Requirements

A. Program Travel................................	3,412	4,309	4,053	4,312

Program travel is specifically required for accomplishment of the Center's mission and accounts for approximately 90 percent of the travel budget for 1984. The decrease from the 1983 budget estimate to the 1983 current estimate reflects a partial application of the reductions required by the appropriation reduction and pay raise absorption. The 1983 and 1984 travel provides for the transition of STS operations from verification of performance to actual operational use. This includes the increased activities, both domestic and foreign, related to future STS payloads from the private sector. Travel will be required to support operations activities including launch, mission support, coordination of engineering and technical activities, and support of payload technical integration.

B. Scientific and Technical Development Travel.....	194	153	208	221

Scientific and technical development travel permits employees to participate in meetings and technical seminars with other representatives of the aerospace community. This participation allows them to retain their technical currentness and to benefit from exposure to technological advances outside JSC, as well as to present both accomplishments and concerns to their associates. Many of these meetings are working panels convened to solve certain problems for the benefit of the Government. Symposia and technical seminars related to the earth observation program are a major requirement in this area. The increase between the 1983 budget estimate and the 1983 current estimate is based on increased interaction with the scientific community. The 1984 estimate provides for the same level of travel as in 1983 at expected travel costs.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of Dollars)		
C. Management and Operations Travel...............	200	247	225	240

Management and operations travel is used for the direction and coordination of general management matters. It includes travel in such areas as personnel, financial management, and procurement activities; travel of the Center's top management to NASA Headquarters and other NASA Centers; and local transportation. The 1984 estimate provides the same level of travel as in 1983 at expected travel costs.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of Dollars)		
III. OPERATION OF INSTALLATION.....................	**43,939**	**50,208**	**46,402**	**54,195**

Summary of Fund Requirements

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
A. Facilities Services............................	22,755	27,093	24,677	28,177
B. Technical Services.............................	6,646	6,492	5,699	7,728
C. Management and Operations......................	14,538	16,623	16,026	18,290
Total, Operation of Installation..............	43,939	50,208	46,402	54,195

Explanation of Fund Requirements

Operation of Installation provides a broad range of services, supplies, and equipment in support of the Center's institutional activities. These are divided into three major functional areas: Facilities Services, the cost of maintaining and repairing institutional facilities and equipment, and the cost of custodial services and utilities; Technical Services, the cost of automatic data processing for management activities, and the cost of educational and informational programs and technical shops supporting institutional activities; and Management and Operations, the cost of administrative communications, printing, transportation, medical, supply, and related services.

The decrease from the 1983 budget estimate to the 1983 current estimate is primarily due to the delay and deferral of activities and a rephasing of support contractor funding plans to accommodate the Congressional reduction and partial absorption of 1982 increased pay costs. The increase in 1984 includes rate increases for energy, support contracts, and administrative communications and the full year funding of support contracts.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of Dollars)		
A. FACILITIES SERVICES	**22,755**	**27,093**	**24,677**	**28,177**

The Johnson Space Center is located on 1,620 acres with a complex of laboratory and office buildings, as well as test facilities. This complex encompasses 2,799,041 gross square feet of building space in 91 primary buildings including eleven major technical facilities. There are also an additional 37 secondary buildings. This physical plant supports an average daily on-site population of approximately 7,700 personnel plus an additional 3,900 personnel located off-site at nearby facilities and Ellington Air Force Base. Many of the test facilities are utilized on schedules involving more than one shift or during off-peak hours. These budget estimates also include resources associated with the physical plant requirements of the White Sands Test Facility and for facilities used at Ellington Air Force Base.

Summary of Fund Requirements

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
1. Maintenance and Related services	6,939	8,028	6,628	8,753
2. Custodial services	4,291	4,751	4,303	5,167
3. Utility Services	11,525	14,314	13,746	14,257
Total, Facilities Services	22,755	27,093	24,677	28,177

Explanation of Fund Requirements

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
1. Maintenance and Related Services	6,939	8,028	6,628	8,753

This activity involves routine maintenance and facilities support for JSC at Houston, as well as White Sands Test Facility and Ellington Air Force Base, and includes such activities as support for utility systems; administrative office alterations and painting; mowing and edging of 620 acres of improved land and mowing another 694 acres of unimproved land; cultivation, mulching, fertilizing, insect control, and care of trees and shrubs: engineering design, drafting, and specifications preparation for construction of facilities: minor construction and repair projects: and other facility and system design and modification tasks. The reduction from the 1983 budget estimate to the 1983 current estimate reflects delay and deferral of activities. The increase in 1984 is due to anticipated support contractor wage increases and the full year funding of support contractors.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of Dollars)		
2. Custodial Services..........................	4,291	4,751	4,303	5,167

This activity involves support contractor effort at JSC to provide security guard services such as protection of classified information and badging for all on-site personnel and official visitors; janitorial services to 2.55 million square feet of floor space (including highly specialized services to cleanroom areas): and fire protection services such as maintenance of alarms and fixed fire fighting equipment, and industrial safety and inspection. The reduction from the 1983 budget estimate to the 1983 current estimate is due to rephasing the support contractor funding plan. The increase in 1984 reflects full year funding of support contracts at anticipated wage rates.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
3. Utilities Services..........................	11,525	14,314	13,746	14,257

This category includes purchased utilities and support contractor effort for the operation and maintenance of the utility distribution system at JSC. The decrease from the 1983 budget estimate to the 1983 current estimate reflects current rate estimates for purchased utilities. The increase from 1983 to 1984 is attributable to rate escalation for utilities and support contractors.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of Dollars)		
B. TECHNICAL SERVICES	**6,646**	**6,492**	**5,699**	**7,728**

Summary of Fund Requirements

1. Automatic Data Processing	3,740	3,659	3,078	4,480
a. Equipment	1,158	563	733	619
b. Operations	2,582	3,096	2,345	3,861
2. Scientific and Technical Information	2,214	2,084	1,871	2,448
3. Shop and Support Services	692	749	750	800
Total, Technical Services	6,646	6,492	5,699	7,728

Explanation of Fund Requirements

1. Automatic Data Processing	3,740	3,659	3,078	4,480

This activity provides support to all JSC administrative ADP functions; included within this area are institutional portions of lease and maintenance costs of hardware systems within the Central Computer Facility (CCF), as well as contractor effort for computer programming, operations, keypunch, and other support personnel. The ADP systems supported include institutional management, finance and accounting, pracurement, contract status and tracking, personnel management, and utility tracking. The reduction from the 1983 budget estimate to the 1983 current estimate is rephasing of the support contractor funding plan, required to accommodate the appropriation reduction and pay raise absorption. The increase in FY 1984 is primarily due to an increase of support contractor rate changes and the full year funding of activities.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of Dollars)		
2. Scientific and Technical Information.......	2,214	2,084	1,871	2,448

This activity provides for a public affairs educational and informational program and support to the Center in provision of various scientific and technical information services. Included in the public affairs program are: motion picture production, from script to screen; film clip preparation; exhibit management and refurbishment; visitor orientation tours; lecturing; mail answering services; and other public affairs activities. The decrease from the 1983 budget estimate to the current estimate reflects a rephasing of the support contractor funding plan. The increase in 1984 over the 1983 current estimate results from the full year funding of support contracts at anticipated wage rates.

3. Shop and Support Services..................	692	749	750	800

These funds provide for a support contractor who provides graphics and photographic services. Graphic materials are prepared for use in presentations and senior management reviews. Various kinds of film are processed and reproductions and reprints made. An increase in 1984 is based on anticipated support contractor wage rates.

C. MANAGEMENT AND OPERATIONS.......................	14,538	16,623	16,026	18,290

Summary of Fund Requirements

1. Administrative Communications...............	4,811	5,362	5,738	6,121
2. Printing and Reproduction..................	211	200	220	240
3. Transportation.............................	2,174	2,427	2,526	2,783
4. Installation Common Services...............	7,342	8,634	7,542	9,146
Total, Management and Operations..........	14,538	16,623	16,026	18,290

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of Dollars)		

Explanation of Fund Requirements

1. Administrative Communications..............	4,811	5,362	5,738	6,121

Communications support for JSC and WSTF consists of local and long distance telephone service, and other communications services. Local service includes Centrex lines and telephones at JSC and WSTF. Long distance service includes the cost for FTS, commercial toll calls, and a small number of dedicated voice circuits. Other communications services include teletype and wire news services; the operation and maintenance of a closed circuit TV system, fire alarms, burglar alarms, and public address systems. The increase from the 1983 budget estimate to the 1983 current estimate reflects an increase in FTS rates. The increase in the 1984 estimate is rate changes for both local service and FTS.

2. Printing and Reproduction.................	211	200	220	240

Basic printing requirements are handled by maintaining an on-site printing plant operated by JSC personnel. This printing plant produces approximately 60 million units of printing each year. In addition to this on-site printing plant, JSC must also purchase printing from private firms through Government Printing Office contracts. This purchased printing is both overflow requirements that cannot be handled on-site and printing which requires capabilities not available at the on-site plant. The 1983 current estimate is higher than the 1983 budget estimate due to higher than estimated cost rates. The 1984 estimate increases for the same reason.

3. Transportation................................	2,174	2,427	2,526	2,783

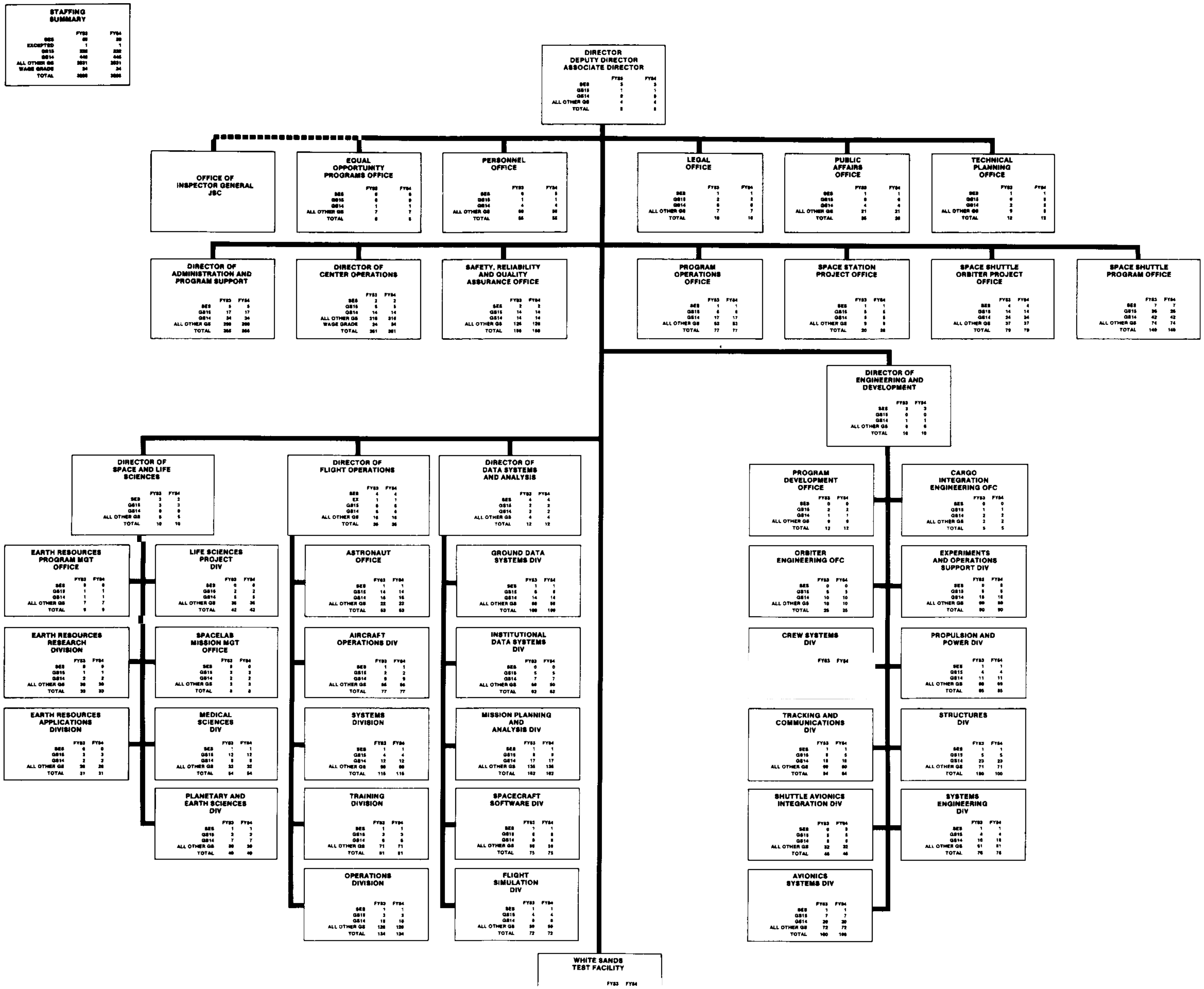
Transportation functions at JSC include administrative aircraft maintenance and fuel costs, lease of passenger vehicles and trucks, maintenance of vehicles, and provision of GSA drivers and dispatchers. The increases from the 1983 budget to the 1983 and 1984 current estimates are primarily due to increased in aircraft fuel costs and GSA lease costs for the Center motor pool.

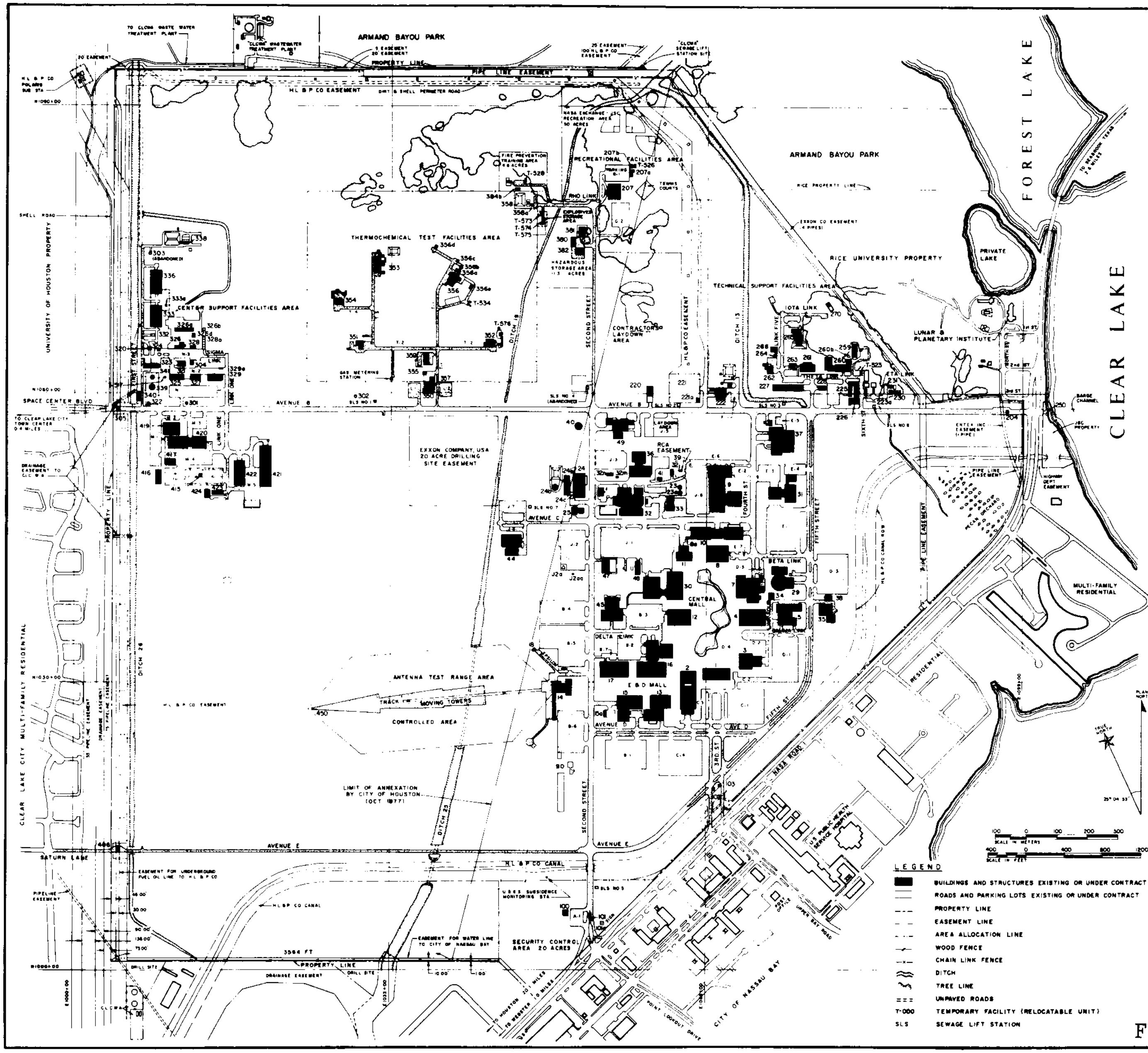
	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of Dollars)		
4. Installation of Common Services............	7,342	8,634	7,542	9,146

These services support Center management and staff activities, provide medical services, and cover various installation support services. Center management and staff functions include legal, personnel, procurement, and EEO activities. Medical services provided include occupational medicine and environmental health, consisting of the operation of the JSC on-site clinic; emergency assistance at Ellington Air Force Base (EAFB); providing physicals for JSC personnel at Downey, California; medical consultation and crew test support; indusrial hygiene; radiological health; and an environmental health laboratory. Installation support services include administrtive supplies, materials and equipment at the Center and at White Sands Test Facility (WSTF); identification and cataloging of supply requests, placing orders on the proper Federal Schedule Contracts and maintaining a stock catalog; operation of a central receiving depot for supplies; warehousing; bonded storage and storage of hazardous materials; stock issuance; payments to the United States Postal Service for postage on official mail; shipping and packing of supplies and equipment both locally and for long distance movement; moving and hauling of items within JSC; delivery of supplies, materials and equipment purchased from local suppliers; JSC share of operating costs at EAFB; stenographic services; torts and claims; inspection services; and miscellaneous administrative support. The decrease from the 1983 budget estimate to the 1983 current estimate is due to a rephasing of the support contractor funding plan. The increase in the 1984 budget estimate reflects a full year funding for support contracts.

NASA-S-82-10792

LYNDON B. JOHNSON SPACE CENTER





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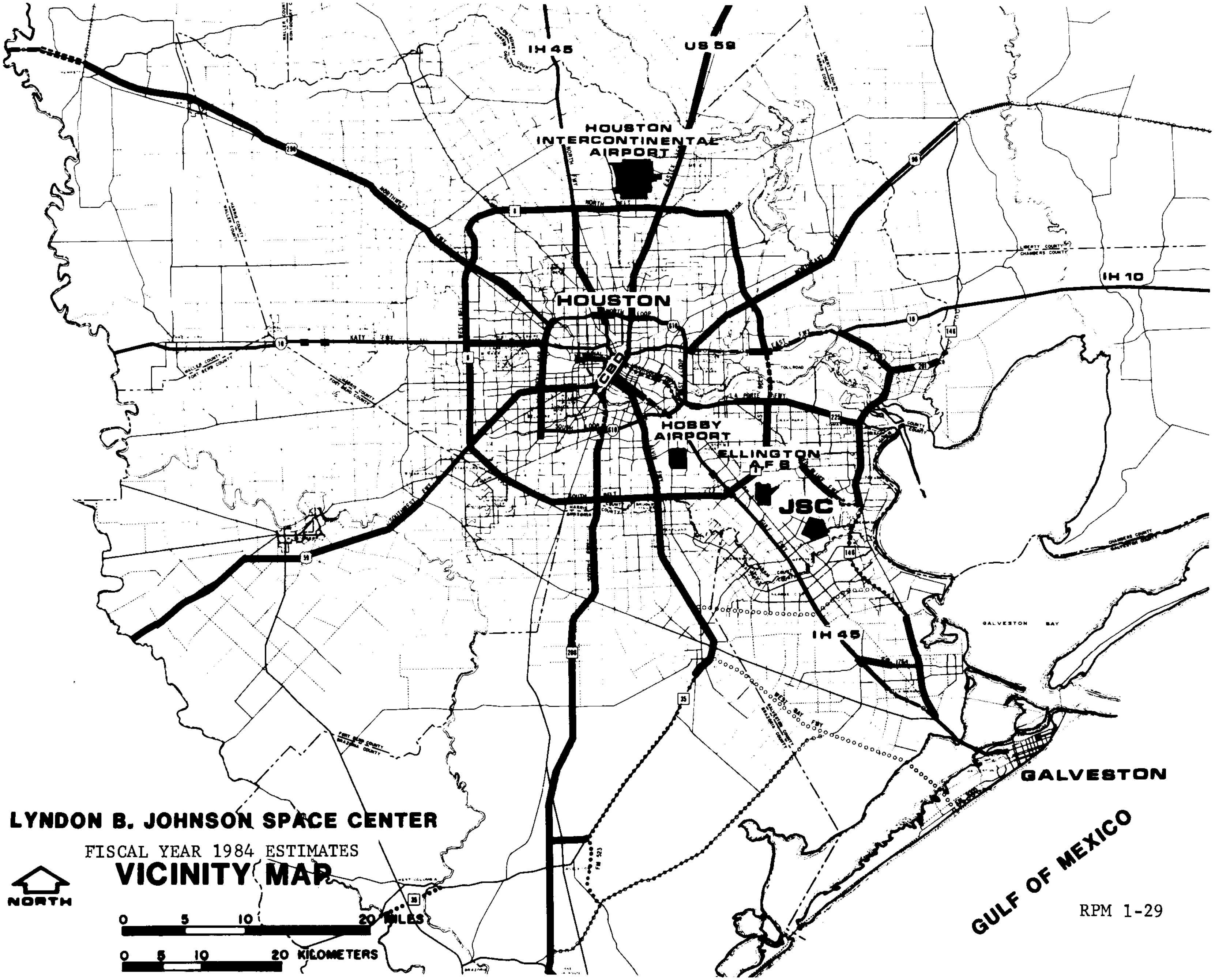
LYNDON B JOHNSON SPACE CENTER
CLEAR LAKE TEXAS

MASTER SITE PLAN

FISCAL YEAR 1984 ESTIMATES



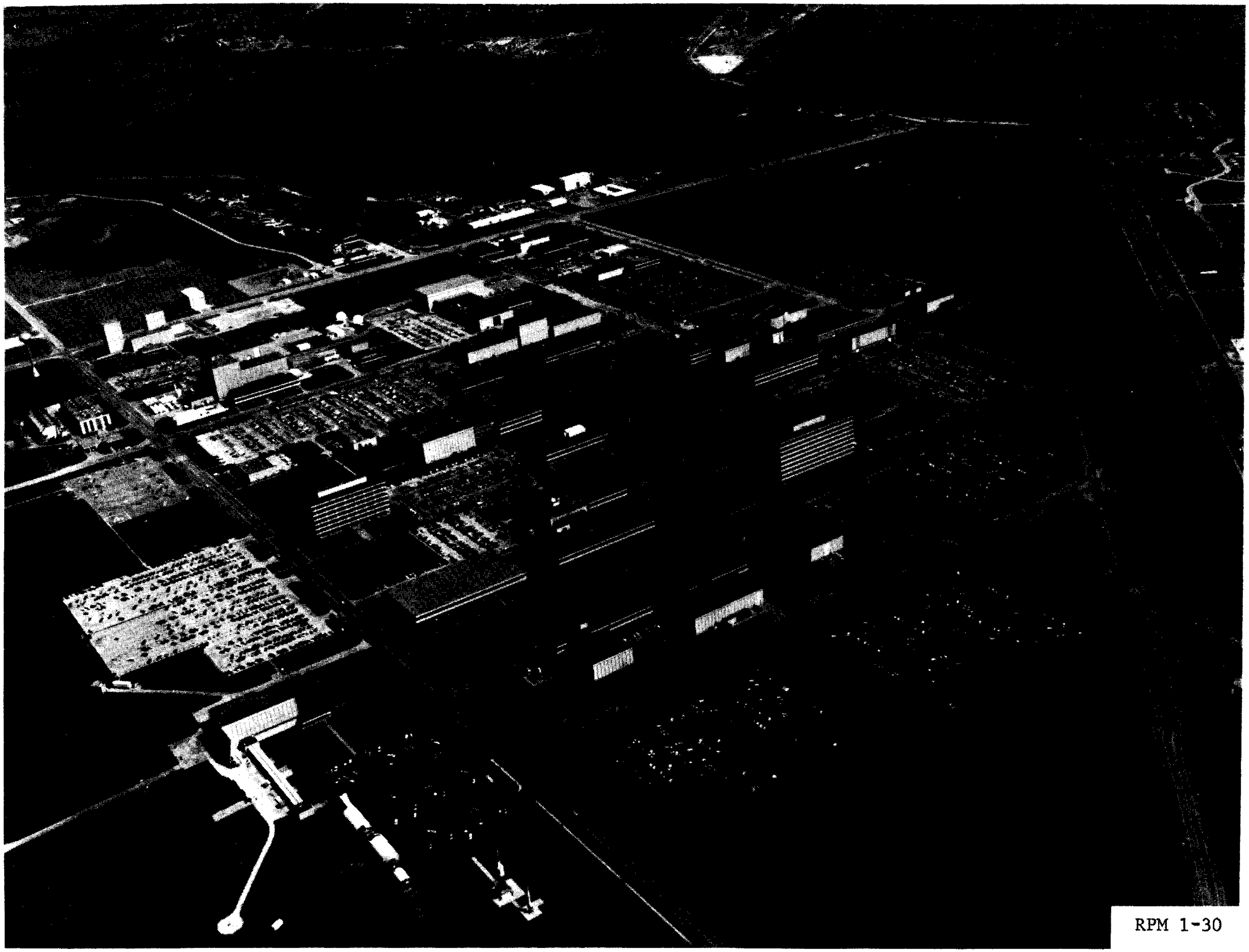
LYNDON B. JOHNSON SPACE CENTER

FISCAL YEAR 1984 ESTIMATES

VICINITY MAP

RPM 1-29

FISCAL YEAR 1984 ESTIMATES



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KENNEDY
SPACE CENTER

RESEARCH AND PROGRAM MANAGEMENT

FISCAL YEAR **1984 ESTIMATES**

JOHN F. KENNEDY SPACE CENTER

DESCRIPTION

The John F. Kennedy Space Center (KSC) is located 50 miles east of Orlando, Florida. The total land and water area occupied by the installation is 139,305 acres. NASA owns 82,943 acres of that total. The remainder is comprised of the Banana River Causeway Easement, 271 acres; the Indian River Causeway Easement, 296 acres; and Florida-owned submerged lands with Deed of Dedication, 55,795 acres.

Space Shuttle flights began at KSC in 1981 and will begin at Vandenberg Air Force Base, California in 1985. Expendable launch vehicle operations are conducted at both the Air Force's Eastern Space and Missile Center, at Cape Canaveral Air Force Station, Florida, and the Western Space and Missile Center at Vandenberg Air Force Base, California, which is located six miles west of Lompoc, California.

The NASA capital investment at the Kennedy Space Center, Cape Canaveral Air Force Station, and Vandenberg Air Force Base, including fixed assets in progress and contractor-held facilities as of September 30, 1982, was $2,502,406,000.

CENTER ROLES AND MISSIONS

The Launch Operations Center was established at Cape Canaveral, Florida, in July 1962 to serve as the primary NASA center for the test, checkout, and launch vehicles. In late 1963, it was named the John F. Kennedy Space Center and in 1964 the Center was relocated to Merritt Island. This site was chosen because of its unique geographical characteristics, climate, local growth capability, accessibility, and availability. The center has since become the major free world launch site with a unique civil service staff of unparalleled expertise in the test, checkout, and launch of space vehicles and in the design of associated ground support equipment. The technical facilities developed at KSC represent a major national resource. The principal roles of the Center are:

Space Transportation System (STS) Ground Operations - Includes Space Shuttle launch preparation, launch recovery and refurbishment, Spacelab and Spacelab payloads ground processing, upper stages ground processing, and operation and maintenance of ground support equipment.

Expendable Launch Vehicle Operations - Includes launch preparation, checkout and launch for the current inventory of launch vehicles.

SUMMARY OF RESOURCES REQUIREMENTS

Funding Plan by Function

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of Dollars)		
I. Personnel and Related Costs....	82,752	83,431	87,292	88,408
11. Travel........................	1,258	1,687	1,841	2,063
III. Operation of Installation......	71,948	84,382	74,208	83,001
A. Facilities Services........	(45,499)	(58,077)	(50,644)	(56,815)
B. Technical Services.........	(9,915)	(10,014)	(8,282)	(8,903)
C. Management and Operations..	(16,534)	(16,291)	(15,282)	(17,283)
Total, fund requirements....	155,958	169,500	163,341	173,472

Distribution of Permanent Positions by Program

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
Direct Positions				
Space Transportation System	1,491	1,480	1,451	1,437
Space transportation capability development	1,301	431	402	351
space transportation operations	190	1,049	1,049	1,086
Space Science and Applications	80	85	104	113
physics and astronomy	77	82	98	107
Life sciences	2	3	4	4
Space applications	1	---	2	2
Technolosy Utilization	5	2	4	5
Aeronautics and Space Technology	5	---	8	12
Space research and technology	5	---	8	12
Subtotal, direct positions	1,581	1,567	1,567	1,567
Center Management and Operations Support	552	545	545	545
Total, permanent positions	2,133	2,112	2,112	2,112

PROGRAM DESCRIPTION

	Permanent Positions (Civil Service)
SPACE TRANSPORTATION CAPABILITY DEVELOPMENT....................................	351

The Kennedy Space Center is responsible for the launch and landing project of the Space Shuttle program. Major roles include launch systems development and Space Transportation System (STS) ground systems development. These roles will continue to be performed for the operational Space Shuttle era.

Although construction of most new launch support facilities and modifications of most existing facilities will be completed, KSC will continue the design, modification or acquisition, installation and checkout of equipment and facilities to be used in support of increased launch rate requirements. This includes equipment provided by KSC contractors, as well as equipment to be supplied by development contractors as part of their flight vehicle responsibilities.

The first Space Shuttle landing at KSC is scheduled in 1983. Although installation and checkout of initial operational systems will be complete and the ground support equipment installed, there are ongoing new requirements and modifications to existing systems, including the Launch Processing System (LPS).

KSC will continue to support Launch Pad B construction activities, Launch Complex 39 modifications, and other modifications to facilities or equipment to meet Space Shuttle requirements.

The Center's role in the Spacelab program is similar to that of the Space Shuttle; that is, KSC is responsible for launch site development and for ground operations. Since delivery of the Spacelab engineering model in 1981 and Spacelab flight equipment, KSC has undertaken the responsibility for verifying the Spacelab flight and ground systems and ensuring that the experiments that are to be mounted on or in the Spacelab are compatible with the Spacelab, with each other, and with safety requirements. The first Spacelab flight unit has arrived at KSC and is in preparation for the initial flight in 1983.

The upper stages currently consist of the Inertial Upper Stage (IUS), Centaur, and the Spinning Solid Upper Stage (SSUS). These upper stages are expendable, propulsive stages intended for use in the deployment of Space Shuttle transported payloads to high energy orbits not attainable by the Space Shuttle alone. The IUS has been developed by the Air Force, and the delivery and successful launch by the Air Force of the first flight unit by a Titan vehicle occurred in 1982. KSC will be responsible for mating the spacecraft to the IUS. Design review of the IUS integration activities will continue with the first flight scheduled for 1983.

Under current plans the SSUS will be developed, checked out and mated to a payload by the SSUS commercial developer. KSC will have responsibility for integration of the SSUS and its payload and then into the Shuttle payload bay. KSC is currently engaged in modifying the launchsite facilities to accommodate the use of the Centaur as a Shuttle upper stage. These modifications affect the launch pads and the mobile launcher platforms and are planned for completion in time to support the Galileo and International Solar Polar V missions in 1986.

KSC will provide facilities and support to the various developers and experimenters during payloads processing at KSC. KSC, in concert with other NASA organizations will analyze potential payload users' requirements and activities. Based on experience gained during the Expendable Launch Vehicle program, KSC will monitor payload activity from conception: participate in design reviews to ensure compatibility with KSC facilities; and provide support coordination during the payload checkout and launch at KSC. KSC is participating in the definition activities of a permanent manned space station.

	Permanent Positions (Civil Service)
SPACE TRANSPORTATION OPERATIONS	1,086

The ground operations role at KSC includes the test and checkout of each flight element as it arrives at KSC for flight: the integration of the elements, Orbiter, External Tank, Solid Rocket Boosters and their subsystems into the Space Shuttle vehicle: and the integrated testing of the stacked configuration, propellant loading, and launch. Subsequent to landing, the Orbiter will be refurbished by KSC in preparation for the next mission. KSC is responsible for retrieval, disassembly, and refurbishment of the expended Solid Rocket Boosters. KSC will also continue the refurbishment of selected existing support equipment for reuse in the Space Shuttle system. KSC is responsibe for contingency landing site preparations for ferrying the Orbiter back to KSC. Orbiter 102, used in the Orbital Flight Test Program, checkout, will be modified during 1983 at KSC for the initial Spacelab mission scheduled for September 1983 flight. Orbiter 099 arrived at KSC in July 1982 and Orbiter 103 is scheduled for arival in late 1983.

The Center is responsible for the launch preparation, checkout, support coordination during the payload checkout, and launch of the current inventory of expendable launch vehicles. This includes the Atlas Centaur and Delta vehicles. Launches at both the Eastern Space and Missile Center (ESMC) and Vandenberg Air Force Base (VAFB) are the responsibility of KSC.

	Permanent Positions (Civil Service)
PHYSICS AND ASTRONOMY..	107

KSC is responsible for planning and coordinating the Level IV integration and launch site support of mission experiments for Spacelab missions. Interfaces are established and maintained with the NASA discipline program offices, the Principal Investigators, and appropriate engineering groups to assure that scientific objectives of the mission are met.

LIFE SCI~C~..	4

Kennedy Space Center will continue its support role in the definition, development and integration of biomedical experiments into Space Shuttle payloads for life sciences research. Included is the responsibility for providing and managing a Life Sciences Principal Investigator Support Facility and assisting in the conduct of life sciences synchronous ground control experiments and procedures required for life sciences payloads. These experiments are designed to use the environment of space to accomplish medical and biological research for the benefit of man.

SPACE APPLICATIONS..	2

Space Shuttle launch and landing operation studies are conducted to provide environmental observations, applied research, and data analysis.

TECHNOLOGY UTILIZATION..	5

The objectives of the Technology Utilization program at KSC is to encourage the use of and to expedite the application of new NASA technology to sectors outside the Agency.

	Permanent Positions (Civil Service)
SPACE RESEARCH AND TECHNOLOGY..	12

KSC conducts investigations of improved equipment, software and operational techniques to increase the safety and efficiency of KSC ground systems for present and future space systems.

CENTER MANAGEMENT AND OPERATIONS SUPPORT..........	545

Center Management and Operations Support provides support to all Kennedy Space Center organizations which cannot be identified exclusively to a single program or project. The civil service personnel involved are:

Director and Staff - The Center Director, Deputy Director, and the immediate staff, e.g., Legal, Patent Counsel, Equal Opportunity, Public Affairs, and Safety.

Management Support - The part of the KSC civil service workforce who provide information and control services supporting all levels of center management, both program and functional. Specific functions include resources and financial management, program control, contracting and procurement, property managment, personnel management, and management systems and analysis.

Operations Support - The part of the KSC civil service workforce who provide for the operation and maintenance of institutional facilities, buildings, systems and equipment, including those who manage or provide technical services such as automatic data processing, reliability and quality assurance, medical care, and photographic support.

RESOURCES REQUIREMENTS BY FUNCTION

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of Dollars)		
I. PERSONNEL AND RELATED COSTS	82,752	83,431	87,292	88,408

Summary of Fund Requirements

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
A. Compensation and Benefits				
1. Compensation				
a. Permanent positions	71,285	71,435	73,534	73,689
b. Other than full-time permanent positions	1,503	1,534	1,562	1,590
c. Reimbursable detailees	42	---	49	49
d. Overtime and other compensation	2,082	2,592	2,503	3,180
Subtotal, Compensation	74,912	75,561	77,648	78,508
2. Benefits	7,342	7,335	8,879	9,098
Subtotal, Compensation and Benefits	82,254	82,896	86,527	87,606
B. Supporting Costs				
1. Transfer of personnel	117	335	230	230
2. Personnel training	381	200	535	572
Subtotal, Supporting Costs	498	535	765	802
Total, Personnel and Related Costs	82,752	83,431	87,292	88,408

Explanation of Fund Requirements

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of Dollars)		
A. Compensation and Benefits........................	82,254	82,896	86,527	87,606
1. Compensation.....	74,912	75,561	77,648	78,508
a. Permanent Positions.....................	71,285	71,435	73,534	73,689

The current estimate for 1983 reflects a change from the 1983 budget estimate due to the recent pay increases.

Basis of Cost for Permanent Positions

In 1984 the cost of permanent positions will be $73,689,000, an increase of $155,000 over 1983. The increase is calculated as follows:

Cost of Permanent Positions in 1983..		$73,534
Cost increases in 1984:..		+1,808
Within-grade and career advances:		
Full year effect of 1983 actions..............................	+882	
Partial year effect of 1984 actions	+853	
Full year effect of 1983 pay increase..........................	+73	
Cost decreases in 1984...		-1,653
Turnover savings and abolished positions:		
Full year effect of 1983 actions............................	-391	
Partial year effect of 1984 actions..........................	-732	
One less paid day in 1984..	-283	
Alteration in the method of calculation of salaries paid (P.L. 97-253)..................................	-247	
Cost of Permanent Positions in 1984..............................		73,689

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of Dollars)		
b. Other than full-time permanent positions				
(1) cost..............................	1,503	1,534	1,562	1,590
(2) Workyears..........................	119	134	130	130

The distribution of 1984 workyears is as follows:

Distribution of Other than Full-Time Permanent Workyears

Program	Workyears
Developmental progra~...	67
Summer employment progra~..	11
youth opportunity progra~..	31
Other temporary progra~..	21
Total..	130

The reduction from the 1983 budget estimate to the 1983 current estimate results from the recent pay raise and a realignment in temporary employment programs. The increase in 1984 is the full year effect of that planned realignment and pay raise.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
c. Reimbursable detailees............	42	---	49	49

The military personnel detailed to Kennedy Space Center on a reimbursable basis are experienced in Shuttle operations and related fields. The increase from the 1983 budget estimate to the 1983 current estimate provides for the extension of one military detailee through 1984.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of Dollars)		
d. Overtime and other compensation	2,082	2,592	2,503	3,180

Overtime and other compensation includes primarily overtime, holiday pay, and incentive awards. The increase in the 1983 current estimate over the 1983 budget estimate reflects the effect of the 1982 pay increases and additional overtime for the heavier launch schedule. In 1984, the increase is overtime for the increased launch rate.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
2. Benefits..	7,342	7,335	8,879	9,098

The following are the amounts of contribution by category:

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
Civil Service Retirement Fund..................	5,032	5,004	5,468	5,479
Employee life insurance.........................	216	230	226	235
Employee health insurance.......................	1,666	1,517	2,110	2,095
Workmen's compensation....	248	551	285	309
FICA..	35	33	37	38
Medicare..	---	---	750	937
Other benefits..................................	145	---	3	5
Total..	7,342	7,335	8,879	9,098

Retirement and life insurance increases from 1983 budget estimate to the 1983 current estimate are primarily due to the 1982 pay increases. The Workmen's Compensation current estimate for 1983 and the 1984 estimate are based on Department of Labor billings. The increase from 1983 to the 1984 estimate is due to the full year effect of Medicare and the increase in the government's contribution for health insurance.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of Dollars)		
B. Supporting Costs................................	498	535	765	802
1. Transfer of personnel........................	117	335	230	230

Transfer of personnel includes actual expenses involved in the movement and temporary storage of employee's household goods, subsistence and temporary expenses, real estate costs, and miscellaneous moving expenses. The decrease from the 1983 budget estimate to the 1983 current estimate reflects 1982 experience and 1983 projected hiring. The 1984 estimate is the same as 1983.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
2. Personnel training...................... ...	381	200	535	572

The purpose of the KSC training program is to continue the development of the skills and knowledge of civil service employees in order to more efficiently support KSC roles and missions. The increase from the 1983 budget estimate to the 1983 current estimate reflects 1982 experience. The increase in 1984 is due to higher tuition costs.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of	Dollars)	
II. TRAVEL..	**1,258**	**1,687**	**1,841**	**2,063**

Summary of Fund Requirements

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
A. Program Travel................................	912	1,276	1,580	1,737
B. Scientific and Technical Development Travel.. ...	39	6	42	45
C. Management and Operations Travel................	307	405	219	281
Total, Travel................................	1,258	1,687	1,841	2,063

Explanation of Fund Requirements

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
A. Program Travel................................	912	1,276	1,580	1,737

Program travel is directly related to the accomplishment of KSC's mission and accounts for approximately 85 percent of the Center's travel budget. Program travel reflects the Center's continued involvement in launch site development, the design, manufacturing, and testing of ground systems equipment, design and construction of facilities, and the activation of systems manufactured at off-site locations.

The increase from the 1983 budget estimate to the 1983 current estimate primarily reflects additional Space Shuttle landings at DFRC and higher than anticipated support to contingency landing sites. The increase in 1984 is due to increased Spacelab and payload requirements which will require significant overseas travel to participate in procedures development.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of Dollars)		
B. Scientific and Technical Development Travel.....	39	6	42	45

Scientific and technical development travel permits employees to participate in meetings and technical seminars with other representatives of the aerospace community. This participation allows them to benefit from exposure to technological advances outside KSC, as well as to present both accomplishments and concerns for the benefit of the government. The increase from the 1983 budget estimate to the 1983 current estimate reflects the requirement to participate in systems studies associated with future programs.

C. Management and Operations Travel................	307	405	219	281

Management and operations travel is used for the direction and coordination of general management matters. It includes travel in such areas as personnel, financial management, and procurement activities; travel of the center's top management to NASA Headquarters, and other NASA Centers; and local transportation. The decrease from the 1983 budget estimate to the 1983 current estimate reflects the effort to support increasing requirements in program travel. The 1984 estimate provides a small increase to restore deferred management reviews and conferences.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of Dollars)		
III. OPERATION OF INSTALLATION....................	71,948	84,382	74,208	83,001

Summary of Fund Requirements

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
A. Facilities Services..........................	45,499	58,077	50,644	56,815
B. Technical Services.............................	9,915	10,014	8,282	8,903
C. Management and Operations.....................	16,534	16,291	15,282	17,283
Total, Operation of Installation.............	71,948	84,382	74,208	83,001

Explanation of Fund Requirement

Operation of Installation provides a broad range of services, supplies, and equipment in support of the Center's institutional activities. These are divided into three major functional areas: Facilities Services, the cost of renting real property, maintaining and repairing institutional facilities and equipment, and the cost of custodial services and utilities; Technical Services, the cost of automatic data processing for management activities, and the cost of educational and informational programs and technical shops supporting institutional activities; and Management and Operations, the cost of administrative communications, printing, transportation, medical, supply, and related services.

Kennedy Space Center is located on 139,305 acres and has a complex of facilities made up of test facilities and office buildings, as well as launch operations facilties. This complex encompasses 5,706,987 gross square feet of building space, including 13 major buildings. Also included are 14 technical facilities. Many facilities are utilized on more than one shift. The needs of KSC's component installations at the Eastern Space and Missile Center and Vandenberg Air Force Base are included. The size, complexity and wide geographical dispersion of KSC facilities place heavy demands on this funding category.

KSC supports an average daily on-site population, contractor and civil service, of approximately 14,000. As an economy measure, KSC provides many centralized institutional and administrative services to the total center population.

The decrease from the 1983 budget estimate to the 1983 current estimate is due to the delay and deferral of activities and a rephasing of support contractor: funding plans to accommodate the Congressional reduction and partial absorption of the 1982 increased pay costs. The increase in 1984 includes rate increases for energy and support contracts, and the full year funding of support contracts.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of Dollars)		
A. FACILITIES SERVICES	45,499	58,077	50,644	56,815

Summary of Fund Requirements

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
1. Rental of Real Property	13	32	25	20
2. Maintenance and Related Services	10,357	13,818	11,561	12,943
a. Facilities	10,038	13,283	10,993	12,318
b. Equipment	319	535	568	625
3. Custodial Services	20,188	24,916	22,078	25,051
4. Utility Services	14,941	19,311	16,980	18,801
Total, Facilities Services	45,499	58,077	50,644	56,815

Explanation of Fund Requirements

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of	Dollars)	
1. Rental of Real Property..................	13	32	25	20

This provides for the rental of off-site facilities for news and reception centers for NASA guests attending launches and other major public events. The decrease from the 1983 budget estimate to the 1983 current estimate reflects reduction in expected host activities.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
2. Maintenance and Related Services...........	10,357	13,818	11,561	12,943

This activity involves the operation and maintenance of institutional facilities, systems, and equipment. It includes office and facility space utilization analysis, corrosion control, grounds maintenance, inspecting, siting and related facility engineering, and maintenance and repair of heavy equipment. These funds also provide building materials, hardware, metals, plumbing supplies, electrical materials, and general maintenance and operating supplies used by support contractors performing the maintenance functions.

The decrease from the 1983 budget estimate to the 1983 current estimate is due to a revised support contractor funding plan. The increase in 1984 is anticipated contractor rate increases and a full year funding for support contracts.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
3. Custodial Services.........................	20,188	24,916	22,078	25,051

This category includes fire protection, security and janitorial services. The demand for these services continues to increase as Space Shuttle launch activities increase. Funding provides janitorial services to two million square feet of KSC's floor areas, including highly specialized services to clean room areas and orbiter support equipment; conducting fire drills and fire inspections of facilities and equipment; and fighting fires. Security protection of personnel and property of KSC involves: support of hazardous tests and operations; badging of all on-site personnel and official visitors; safeguarding flight hardware and other items of high intrinsic value; protection classified information; and maintaining area surveillance and traffic control. Other activities in this category consist of pest control services, laundry services, and supplies and equipment used by the support contractor performing the function.

The decrease from the 1983 budget estimate to the 1983 current estimate is due to a reduction in support contractor manpower and a revised funding plan. The increase in 1984 is anticipated rate increases and a full year funding for support contracts.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of Dollars)		
4. Utility Services...........................	14,941	19,311	16,980	18,801

The major utility at KSC is electrical energy purchased from Florida Power and Light Company through an Air Force contract. Fuel oil is purchased from a local supplier. Steam service is provided by the Air Force at the Eastern Space and Missile Center. Water services are purchased from the City of Cocoa and sewage treatment is accomplished on-site. Utility plant operations and maintenance and utility distribution systems maintenance are provided by a support contractor at KSC, and by the Air Force at the ESMC. At the Vandenberg Air Force Base, utilities are purchased through the Air Force.

The decrease from the 1983 budget estimate to the 1983 current estimate is due to a revision in the phasing of the support contractor funding plans and current utility and contractor wage rates. The 1984 increase provides for estimated utility and contractor wage rates, and the full year funding of support contracts.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of Dollars)		
B. TECHNICAL SERVICES	9,915	10,014	8,282	8,903

Summary of Fund Requirements

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
1. Automatic Data Processing	7,648	7,581	6,025	6,494
a. Equipment	2,839	2,822	1,236	1,325
b. Operations	4,809	4,759	4,789	5,169
2. Scientific and Technical Information	1,549	1,610	1,441	1,510
a. Library	400	619	590	644
b. Education and information	1,149	991	851	866
3. Shop and Support Services	718	823	816	899
Total, Technical Services	9,915	10,014	8,282	8,903

Explanation of Fund Requirements

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
1. Automatic Data Processing	7,648	7,581	6,025	6,494

These funds provide for the development and maintenance of general management ADP programs which, includes the lease, purchase and maintenance of ADP equipment, and programming and operations services. A support contractor provides programming services for payroll, general accounting, supply, procurement, preventive maintenance, contract surveillance, personnel, security, and resources and financial management reports and related management information.

The decrease from the 1983 budget estimate to the 1983 current estimate reflects replacement of an obsolete and maintenance intensive computer in 1982. The increase in 1984 is due to anticipated contractor rate increases.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of Dollars)		
2. Scientific and Technical Information	1,549	1,610	1,441	1,510

This funding provides for operation of a technical library at KSC and for technical and administrative documentation services, including support to the public affairs educational and information program.

A support contractor operates the library facilities, which provide technical and management books and periodicals; and military, federal, and professional society specifications and standards. The contractor also operates a STS and Spacelab documents repository which catalogs, classifies, and indexes documents; and provides document reference and distribution services.

Technical and administrative documentation is provided by a support contractor who prepares publications pertaining to the receipt, checkout, and launch of space vehicles, STS and Spacelab activities, design engineering functions, and various institutional areas. Public affairs support provides for the gathering and dissemination of information about the agency's program to the mass communications media, the general public, and the educational community at the elementary and secondary levels.

The decrease from the 1983 budget estimate to the 1983 current estimate results from a revision to the phasing of the support contractor funding plan at currently estimated wage rates. The increase in 1984 is due to the full year of support contracts at anticipated wage rates.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
3. Shop and Support Services......................	718	823	816	899

These funds provide for a support contractor to perform technical support services such as coordinating institutional activities to assure a constant state of readiness to support test and launch operations. It includes disaster and hurricane planning, and training of all KSC personnel engaged in hazardous occupations. The increase in 1984 is anticipated contractor wage rates.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of Dollars)		
C. MANAGEMENT AND OPERATIONS......................	16,534	16,291	15,282	17,283

Summary of Fund Requirements

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
1. Administrative Communications..............	2,697	1,557	1,265	1,355
2. Printing and Reproduction	4,656	3,707	3,624	3,897
3. Transportation.	4,129	4,282	4,242	4,546
4. Installation Common Services................	5,052	6,745	6,151	7,485
Total, Management and Operations........ ..	16,534	16,291	15,282	17,283

Explanation of Fund Requirements

1. Administrative Communications..............	2,697	1,557	1,265	1,355

These funds provide for the costs of local telephone service, Federal Telecommunications System (FTS), long distance tolls, and special communication services in support of all NASA civil service and institutional contractor personnel located at KSC, ESMC, and VAFB. NASA contractors and other institutions who conduct official business with KSC are widely dispersed throughout the United states. KSC utilizes FTS and other leased lines to minimize costs. Special services include teletype, wire news services and lease and maintenance of various small electrical/electronic systems such as printers which support major communications systems.

The decrease from the 1983 budget estimate to the 1983 current estimate reflects revised communication service requirements and lower rate experience. The 1984 increase reflects expected service rates.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
	(Thousands of Dollars)			
2. Printing and Reproduction....................	4,656	3,707	3,624	3,897

This category includes printing and reproduction services for KSC's institutional population, civil service and contractor. A support contractor provides the major part of the printing effort, while copier service is provided through several smaller contracts. Technical printing includes printing of a wide variety of technical materials, microfilming, duplicating, photostating, blue printing, and other photographic reproductions. Administrative printing includes long lead time items such as forms reproduction, the KSC house organ, and miscellaneous special requirements. Some printing services are performed by other government agencies or by commercial firms under contract to the Government Printing Office (GPO). The decrease from the 1983 budget estimate to the 1983 current estimate is due to reduced rental of printing equipment purchased in 1982. The increase in 1984 is anticipated contractor wage rates.

3. Transportation..............	4,129	4,282	4,242	4,546

Funding covers the transportation management function, performed by a support contractor, which includes coordination, check, inspection, and document control of all shipments, delivery of in-bound shipments, and the operation of heavy equipment. Funding also covers the movement of supplies and equipment by common carrier. The maintenance of KSC's administrative aircraft is also included, as well as the cost of passenger and cargo type vehicles used by civil service personnel, and supplies, materials, and equipment used by the support contractor performing the function.

The increase in 1984 is anticipated contractor wage rates and additional motor vehicle support.

4. Installation Common Services..............	5,052	6,745	6,151	7,485

These funds provide for logistics services, mail and distribution services, medical services, and a wide variety of minor contracts for special and one-time services. A support contractor provides a broad range of logistics services including receipt, storage, and issue of supplies and equipment, as well as maintaining various supply management systems. Mail and distribution services, provided by support contract, include distribution of interoffice mail, classified document control, operation of the KSC branch post office, and postage.

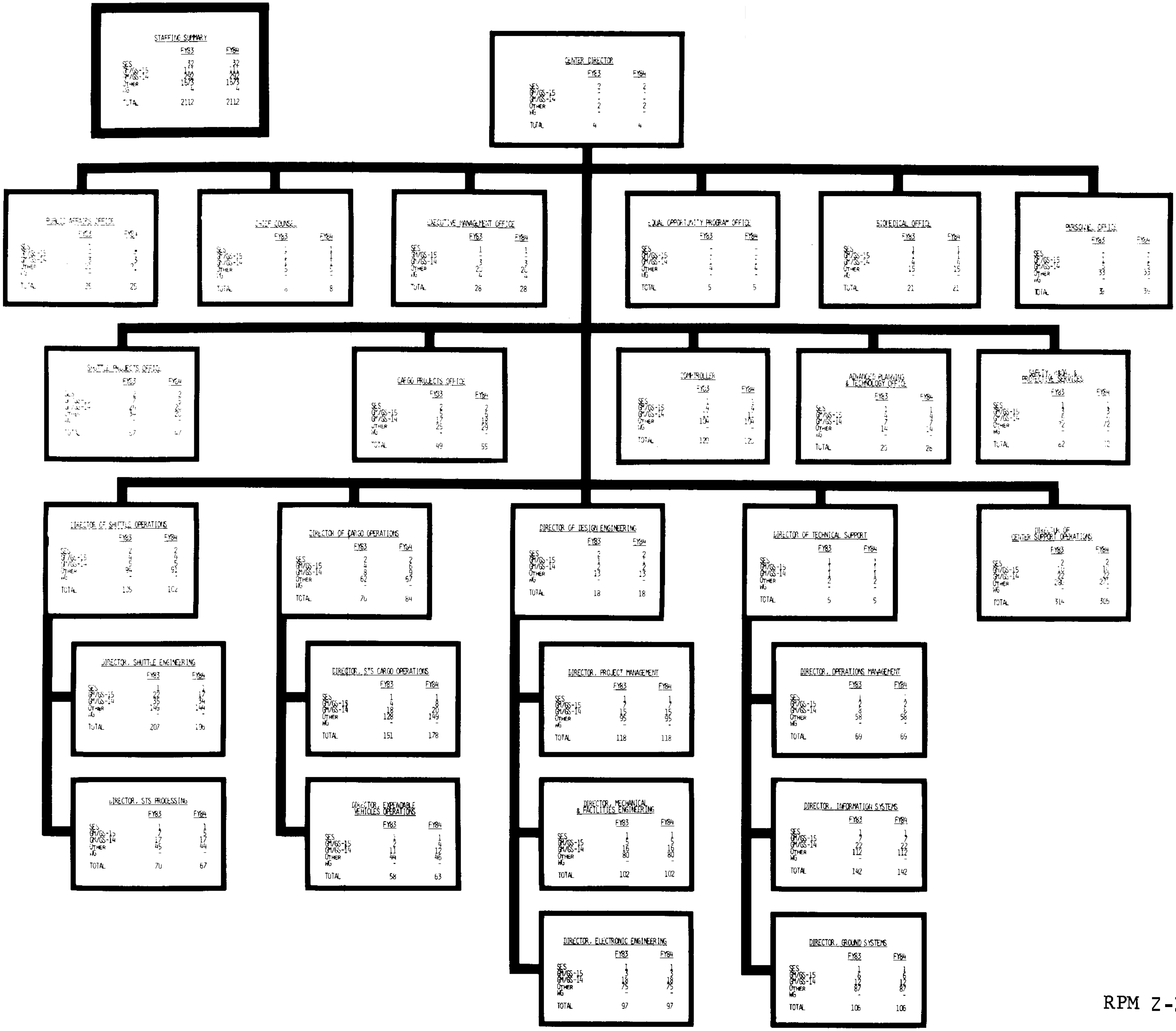
TWO major types of medical services are provided, occupational medicine and environmental health. Occupational medicine includes emergency and first aid care for the workforce, guests, and tour visitors; health maintenance and counseling for civil service employees; and a variety of physical examinations and special programs for health maintenance, applied research, and job certification for civil service and contractor personnel. The contractor has also been charged with ensuring compliance with Occupational Safety and Health Administration standards. The medical program operates on a three-shift basis to provide emergency and ambulance services and special standby service in support of launch operations including hazardous tests and operations. Environmental health consists of industrial hygiene, radiological health, and environmental sanitation program elements. This includes: monitoring hypergolic substances and other toxins; the maintenance of a centerwide toxic substances inventory; surveillance of the potable water supply and distribution; sewage management, sewage treatment and disposal; treatment and disposal of industrial wastes, solid wastes management and disposal; selection and use of pesticides; and the surveillance of sanitation practices in all food services areas.

This category also covers lease, maintenance, and purchase of administrative equipment. Rentals are primarily for special purpose office equipment more economical to lease than purchase. Maintenance is provided for all government-owned administrative equipment in active service. Purchases are largely replacements of office machines such as typewriters and calculators. Office supplies and equipment are provided to all civil service and institutional contractor personnel.

Tort claims, notary public fees, court reporting costs, patent counsel representation, and support costs associated with equal job opportunity activities are also covered under this activity.

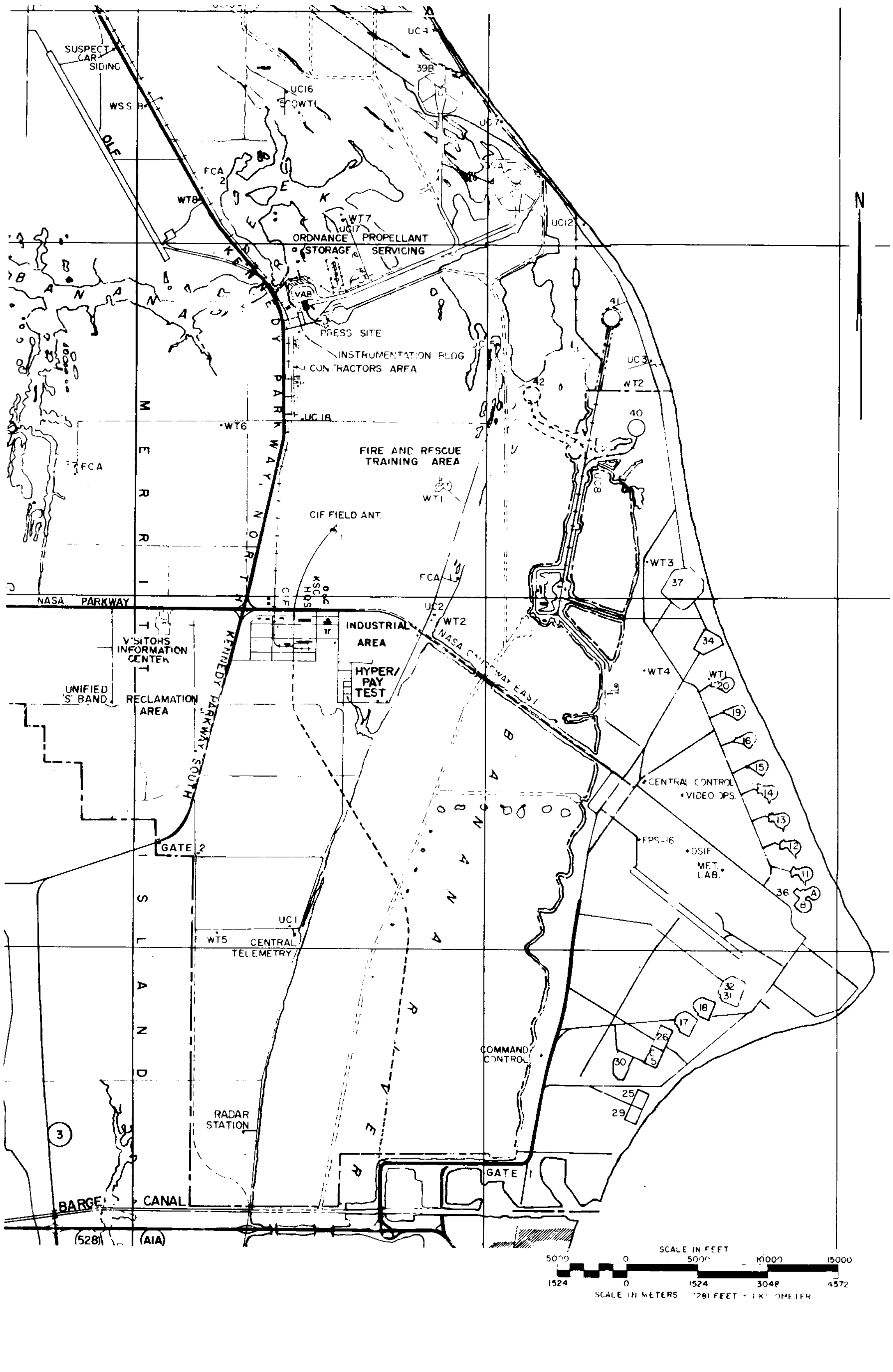
The decrease from the 1983 budget estimate to the 1983 current estimate results from a rephasing of support contractor funding plans at current wage rates. The 1984 budget estimate provides for the full year funding of support contracts at anticipated contractor wage rates.

TRATION


STAFFING SUMMARY
CENTER DIRECTOR
CHIEF COUNSEL
EXECUTIVE MANAGEMENT OFFICE
CARGO PROJECTS OFFICE
COMPTROLLER
ADVANCED PLANNING & TECHNOLOGY OFFICE
DIRECTOR OF SHUTTLE OPERATIONS
DIRECTOR OF CARGO OPERATIONS
DIRECTOR OF DESIGN ENGINEERING
DIRECTOR OF TECHNICAL SUPPORT
DIRECTOR, SHUTTLE ENGINEERING
DIRECTOR, STS CARGO OPERATIONS
DIRECTOR, PROJECT MANAGEMENT
DIRECTOR, OPERATIONS MANAGEMENT
DIRECTOR, STS PROCESSING
DIRECTOR, MECHANICAL & FACILITIES ENGINEERING
DIRECTOR, INFORMATION SYSTEMS
DIRECTOR, ELECTRONIC ENGINEERING
DIRECTOR, GROUND SYSTEMS

JOHN F. KENNEDY SPACE CENTER, NASA
FISCAL YEAR *1984* ESTIMATES

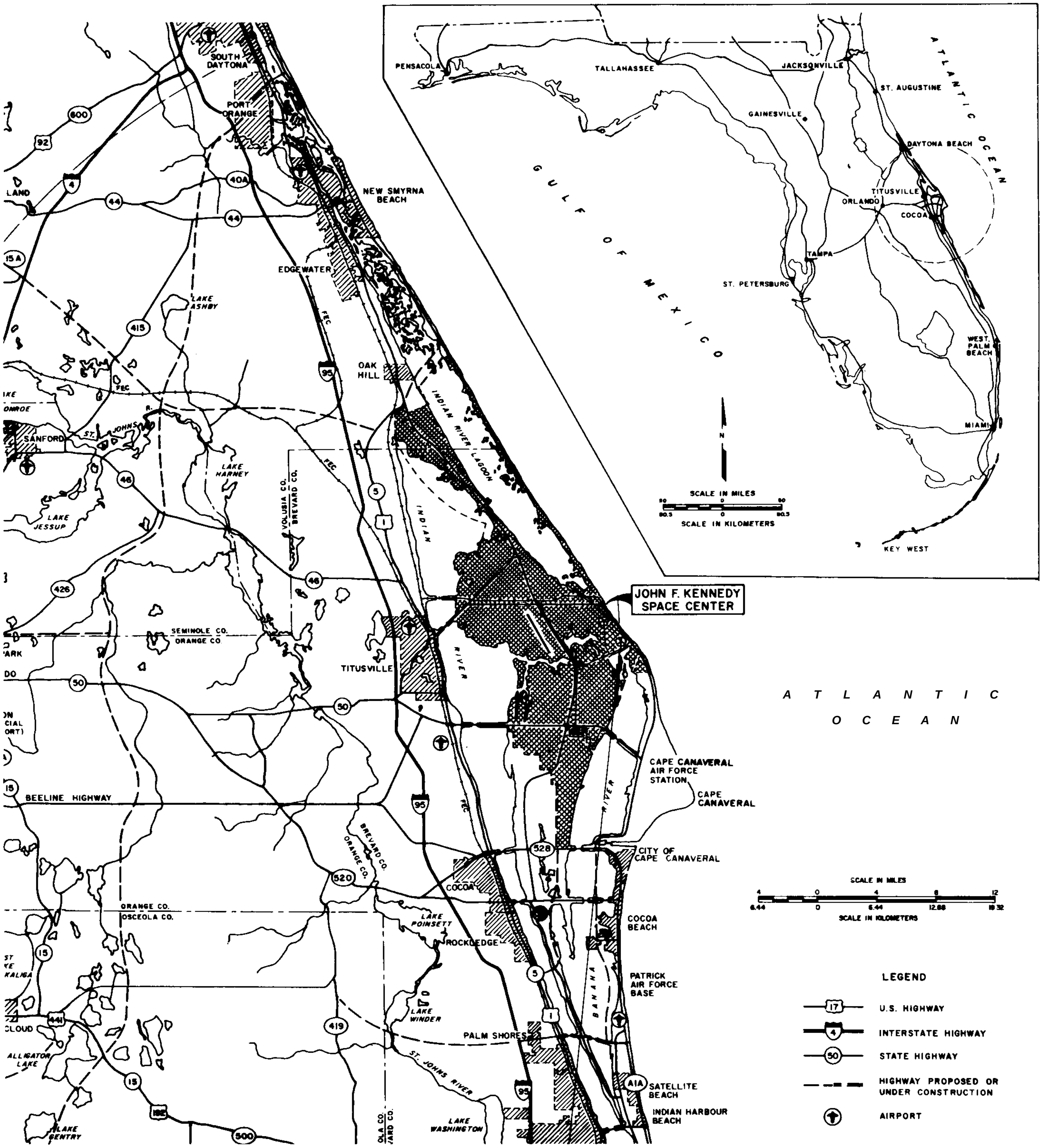
LOCATION PLAN



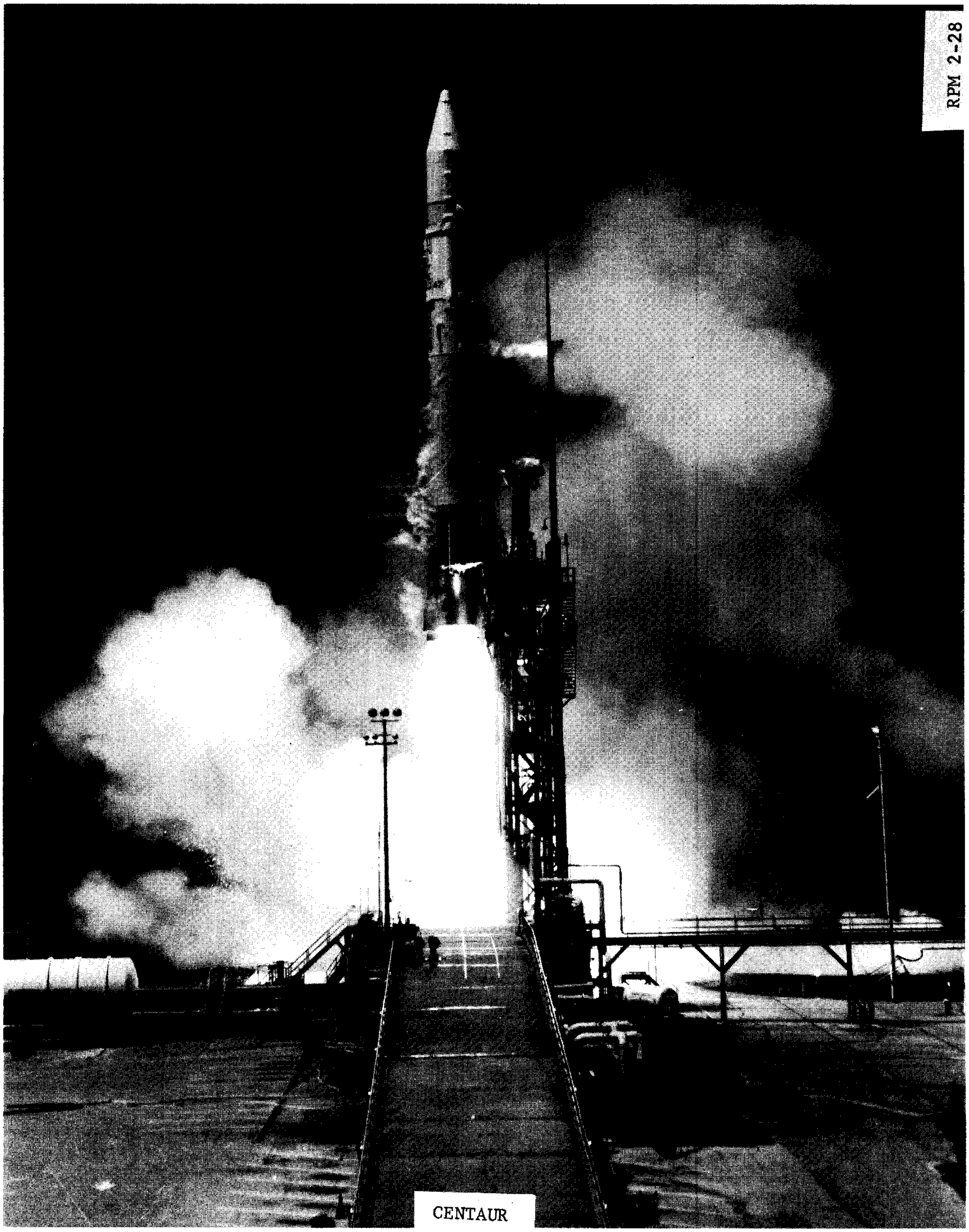
JOHN F. KENNEDY SPACE CENTER, NASA

FISCAL YEAR 1984 ESTIMATES

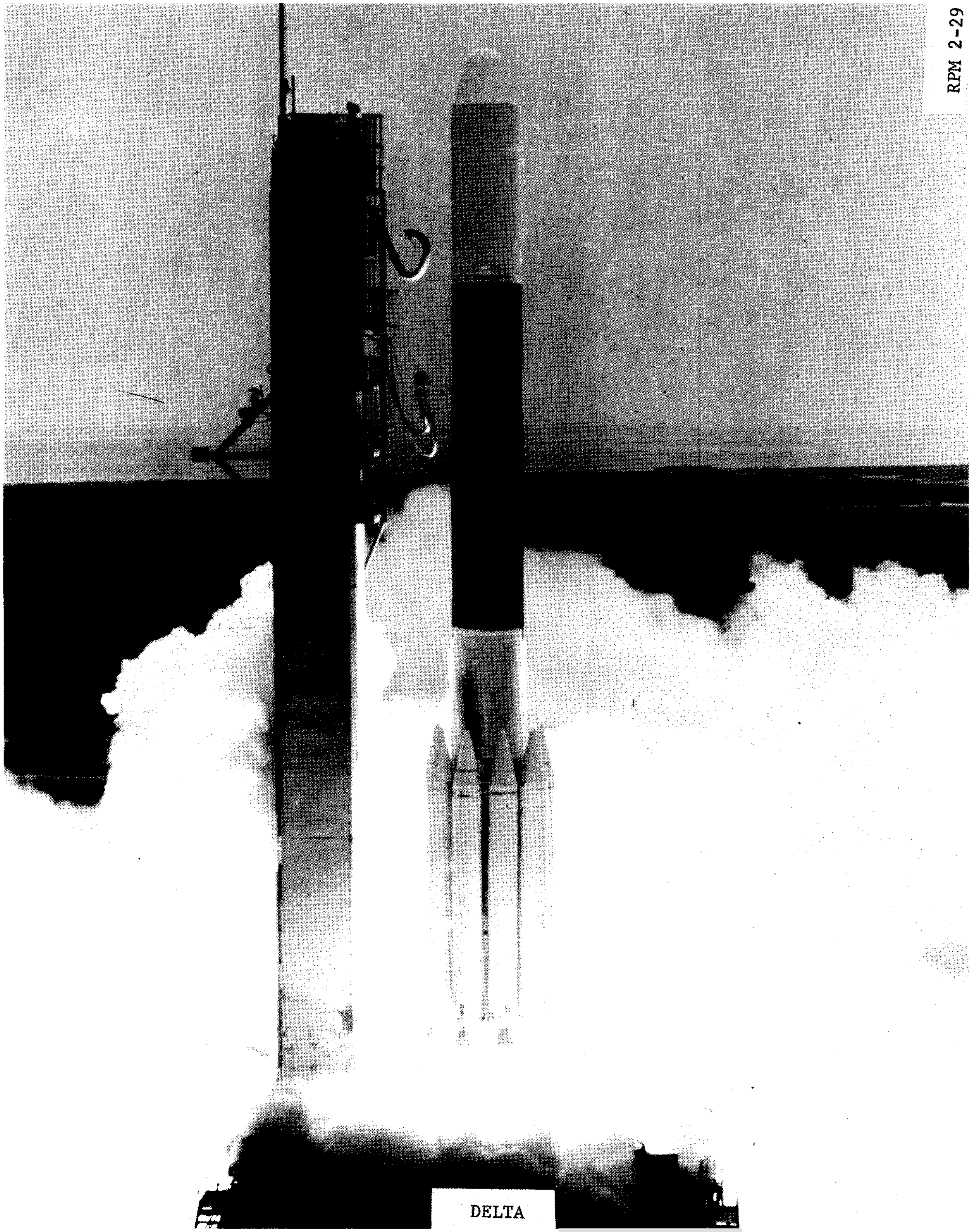
AREA MAP



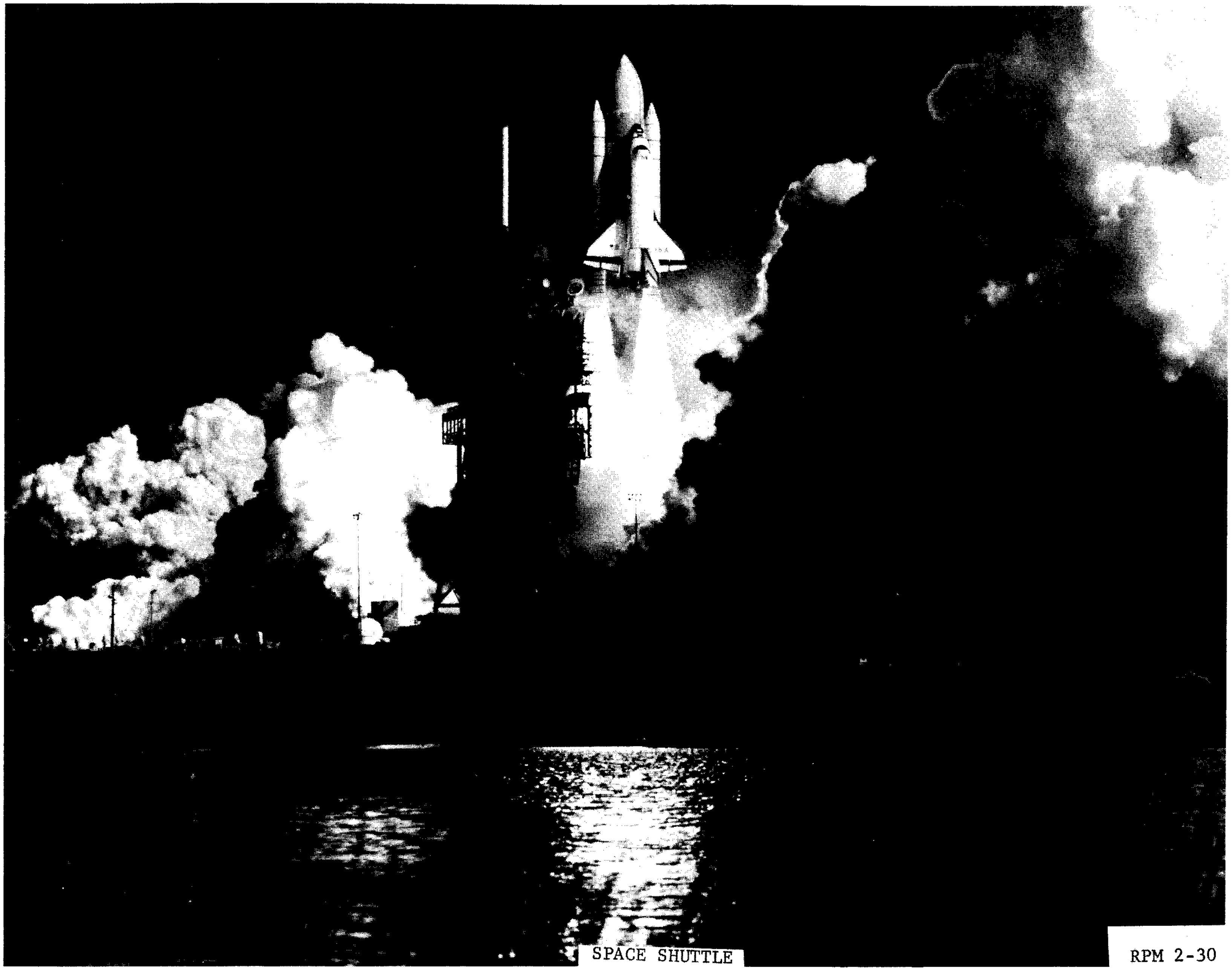
AERIAL VIEW



CENTAUR



DELTA



SPACE SHUTTLE

RPM 2-30

JOHN F. KENNEDY SPACE CENTER
FISCAL YEAR 1984 ESTIMATES
INDUSTRIAL AREA

MARSHALL SPACE
FLIGHT CENTER

RESEARCH AND PROGRAM MANAGEMENT

FISCAL YEAR 1984 ESTIMATES

GEORGE C. MARSHALL SPACE FLIGHT CENTER

DESCRIPTION

Operations at Marshall Space Flight Center (MSFC) are conducted at three primary locations:

The principal MSFC site is near Huntsville, Alabama, on Army property at the Redstone Arsenal. The Center occupies 1,841 acres under a non-revocable use permit from the Army. The Huntsville location is connected by deep water access to its component Michoud Assembly Facility via the Tennessee, Ohio, and Mississippi Rivers.

The Michoud Assembly Facility is located 15 miles east of New Orleans, Louisiana, where the External Tank for the Space Shuttle is being produced, and where activities for other Federal agencies are conducted. The Michoud Facility occupies 832 acres and provides 3,579,872 gross square feet of space, including the main assembly plant, which has an area of 43 acres under one roof. The facility is located on the Gulf Intracoastal Waterway and has deep water access via the Mississippi River.

The Slidell Computer Complex, located at Slidell, Louisiana, 20 miles northeast of the Michoud Assembly Facility, occupies 14 acres and provides centralized computer services for MSFC, Michoud, the National Space Technology Laboratories, other NASA Centers, and associated contractors, as well as other government agencies.

A number of individual facilities at MSFC and its component installations are unique within NASA, the Nation, and the rest of the free world. The combined capability of the science and engineering laboratories, special development facilities, and test facilities, provide a unique national resource for designing, developing, and testing large, complex space systems. The total capital investment of the Marshall Space Flight Center and its installations in Louisiana, including fixed assets in progress, and contractor-held facilities at various locations as of September 30, 1982 was $782,446,000.

CENTER ROLES AND MISSIONS

The Marshall Space Flight Center serves as one of NASA's primary centers for the design and development of Space Transportation Systems, orbital systems, scientific applications payloads, and other systems for present and future space exploration. MSFC has the principal role within NASA for rocket propulsion systems. The Center also has a principal role for the design and development of manned vehicle systems; for Spacelab mission management and payload definition, for design and development of large, complex, and specialized automated spacecraft; and management of space processing activities. MSFC has a primary role within NASA for the development and processing of space science and applications experiments. In addition, MSFC conducts a vigorous research and technology program and is involved in the study and definition of future programs, including significant roles contributing to the development of large, complex space structures, space propulsion systems, materials engineering, materials processing in space, power systems, guidance and control, fundamental electronics, and payload systems analysis and integration.

In addition to on-site activities at Huntsville, Alabama, MSFC manages the Michoud Assembly Facility at New Orleans and the Computer Complex at Slidell, Louisiana. Resident offices are maintained at other centers and in conjunction with major industrial sites in various locations throughout the nation, and in Europe for the Spacelab program. The principal and supporting roles are:

PRINCIPAL

Propulsion Systems - design, development and procurement of major propulsion-oriented systems and subsystems. Current focus is on Space Transportation Systems, including Space Shuttle Main Engine, Solid Rocket Booster External Tank, and Inertial Upper Stage in cooperation with the Air Force. Advanced program efforts are focused on the definition of unmanned launch vehicles, utilizing the existing technology.

Manned Space Vehicle Development - design, development, and procurement of manned vehicle systems as assigned.

- Spacelab - focus is on program management, systems engineering, program and engineering interface with European Space Agency, procurement, activation of the operational era system, and sustaining engineering.

- Advanced Development - technology advances focused on advanced missions.

Space Transportation System (STS) Sustaining Engineering - provide sustaining engineering for STS hardware and software to maintain a design which fulfills the original design intent throughout the life of the STS program, decrease the unit cost of manufacturing through design improvement and upgrade operational performance capabilities through product improvement redesign.

Spacelab Payload Development and Mission Management - management of Spacelabs 1, 2, and 3; partial payload missions as assigned; and definition and development of combinations of payloads, facilities, experiments and instruments for space science and applications missions as assigned.

Specialized Automated Spacecraft - design and development of large, complex and/or specialized automated spacecraft as assigned. Current focus is on spacecraft systems and experiment integration for Space Telescope. Studies are being conducted on potentual future missions such as the Advanced X-Ray Astrophysics Facility and the gravity Probe–B mission.

Space Platform Studies - free–flying platform concepts with attached payloads or docked to a Space Station which would provide power, communications, stabilization, and supporting services.

Space Station - studies of space station mission requirements and technology definition.

space Processing - developing space processing discipline base, enlisting user interest in potential applications, and developing and managing space processing experiments.

SUPPORTING

Space Structures and Materials - contributing to the development of large, complex space structures and materials technology base.

Propulsion Technology - developing and evaluating alternate propulsion systems, techniques, and propellants for advanced launch systems and spacecraft.

SUMMARY OF RESOURCES REQUIREMENTS

Funding Plan By Function

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
	(Thousands of Dollars)			
I. Personnel and Related Costs....................	132,480	132,529	139,352	139,103
11. Travel......................................	2,942	3,413	3,481	3,720
III. Operation of Installation.....................	36,637	41,762	41,119	43,840
A. Facilities Services.......................	(16,971)	(18,774)	(19,027)	(21,216)
B. Technical Services........................	(6,922)	(8,092)	(8,240)	(8,329)
C. Management and Operations..................	(12,744)	(14,896)	(13,852)	(14,295)
Total, fund requirements..	172,059	177,704	183,952	186,663

Distribution of Permanent Positions By Program

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
Direct Positions				
Space Transportation System........................	1,679	1,651	1,588	1,559
Space transportation capability development	1,464	845	1,022	809
Space transportation operations..	215	806	566	750
Space Science and Applications.	988	923	994	1,021
Physics and astronomy..........................	749	693	738	756
Life sciences................................	1	---	2	1
Space applications...	238	230	254	264
Technology Utilization............................	7	6	6	6
Aeronautics and Space Technology....................	159	172	177	179
Aeronautical research and technology...	6	11	6	6
Space research and technology...................	151	161	171	173
Energy technology	2	---	---	---
Subtotal, direct positions..	2,833	2,752	2,765	2,765
Center Management and Operations Support............	518	533	520	520
Total, permanent positions.....	3,351	3,285	3,285	3,285

PROGRAM DESCRIPTION

	Permanent Positions (Civil Service)
SPACE TRANSPORTATION CAPABILITY DEVELOPMENT....................................	809

The Marshall Space Flight Center's major Space Shuttle element assignments are: (1) The Space Shuttle Main Engine (SSME); (2) the Solid Rocket Booster (SRB); (3) the External Tank (ET); and (4) Space Shuttle system level analysis, tests and integration tasks such as ascent control and stability analysis, flight predictions, structural dynamic analysis and modeling, and systems safety and risk analysis.

SSME testing will continue at the National Space Technology Laboratories and the Santa Susana Facility to conduct the engine life confidence testing program, engine acceptance testing, green running of components, and anomaly resolution. SRB activities will include the conduct of development test number six, complete manufacturing of two filament wound case (FWC) development motors, receipt of the initial delivery on the 136-foot diameter main parachutes, completion of the design and testing of the drogue parachutes for the FWC, and the incorporation of TVC/structural protection design including external POD into hardware. The ET effort will continue toward increasing the manufacturing/tooling capability to support the 24 per year flight rate.

Spacelab activities include continuation of program management; deliveries of follow-on production hardware procured from the European consortium; integration of ESA and NASA provided hardware and software; and operational flow processing planning in preparation for the second Spacelab flight in 1984. The delivery of initial operations spares are also scheduled to be completed in 1984.

The third NASA IUS launch (TDRS-C mission) is scheduled in March 1984. A series of readiness reviews will be conducted to assure flight readiness of the IUS prior to launch. The performance of the IUS will be evaluated following the TDRS-C mission. The fourth NASA IUS vehicle is scheduled for delivery in the first quarter of 1984, and the fifth NASA IUS vehicle for delivery in the third quarter of 1984.

The Advanced Programs effort at MSFC includes the definition and implementation of system studies to establish the fundamantal planning and decision making data needed prior to proposing future space programs. Major 1984 advanced studies include: (1) space station; (2) studies of improved propulsion systems; (3) Space Shuttle utilization flight experiments; (4) fabrication of structural elements in space; (5) concept studies of geostationary platforms; and (6) studies of advanced manipulator systems, remote controls, visual aids, and sensory systems to augment the ability of humans to function efficiently in space.

The Tethered Satellite System will provide a new facility for conducting space experiments in regions remote from the Space Shuttle orbiter. MSFC is the lead center for the advanced development of the Tethered Satellite project.

	Permanent Positions (Civil Service)
SPACE TRANSPORTATION OPERATIONS..	750

The Space Shuttle Operations phase started with STS-5, launched in November 1982. During 1984, ten operational flights are planned. Primary activities for 1984 will include the production and acquisition of hardware for operational flights. Typical functions will be production engineering, manufacturing, sustaining engineering, anomaly resolution, logistics, configuration management, systems level analysis, test and integration tasks, ground operations, and contract management.

PHYSICS AND ASTRONOMY..	756

The Center provides leadership in the Agency's Space Science and Applications program for the Space Telescope (ST); Spacelab payload development and mission management including flight experiment development; and provides supporting research and technology efforts to identify the new technologies required for potential future missions.

The objective of the Space Telescope project is to launch a high-quality optical 2.4 meter telescope system by the Space Shuttle for use by the astronomical community. MSFC is the lead center for the management of the Space Telescope development project and has overall implementation responsibility for meeting established cost, schedule, and technical performance goals. MSFC is responsible for technical assessment and evaluation of contracted activities for system engineering, design and development of all areas except the scientific instruments; for overall system assembly and verification; and for maintenance and refurbishment activities. In 1984, verification and acceptance of the Scientific Instruments and Optical Telescope Assembly will be completed and delivered to Lockheed Missiles and Space Corporation for integration with the overall system. Assembly and verification of the Support Systems Module will be completed, and assembly and verification of the Space Telescope system will be initiated leading to a launch in 1985.

In the Spacelab Payload Development and Mission Management area, MSFC is responsible for management and implementation of Spacelab 1, 2, and 3, as well as certain partial payloads, including OAST-1, OSTA-2, OSS-4, and some orbiter mid-deck payloads. MSFC is also responsible for in-house development of selected experiments to be flown on these missions. Mission management responsibility begins with the definition of the payload complement and ends with the dissemination of the experiment data resulting from the flight. During 1984, MSFC will continue to manage the mission planning activities and development of instruments and supporting hardware/software. Spacelab 1 and OSTA-2 are now scheduled for launch in 1983, and Spacelab 2, 3, and OAST-1 are scheduled for launch in 1984. During 1984, interfaces will continue to be maintained with the appropriate NASA program offices, the principal investigators, and other appropriate groups to assure that the scientific objectives of the missions are achieved. MSFC will continue to participate in the analysis of the requirements, objectives, and constraints of STS systems and payload components so as to develop requirements for all levels of integration to insure physical, functional, and operational compatibility for all assigned missions.

Supporting research and technology activities at MSFC are oriented toward developing new technologies required for future space science and applications missions. The principal science areas are Astrophysics and Solar Terrestrial. In 1984, definition study eforts for the Gravity Probe-B and an Advanced X-Ray Astrophysics Facility will continue. The principal space application activities will be in the area of atmospheric research, which supports the definition efforts of future STS payloads.

	Permanent Positions (Civil Service)
LIFE SCIENCES	1

The Life Sciences effort involves the investigation and development of concepts and technologies required to operate long duration life sciences experiments in space.

SPACE APPLICATIONS	264

The MSFC activities are concentrated in two major areas: materials processing in space and atmospheric supporting research.

The Materials Processing emphasizes the fundamental science and technology of processing materials under conditions that allow detailed examination of the constraints imposed by gravitational forces. These studies are directed toward selected materials and processes which will best identify the limitations due to gravity, as well as demonstrate the enhanced control that may be possible by the weightless environment of space. In **1984,** the Materials Processing at MSFC will continue in such areas as: (1) crystal growth and solidification, (2) containerless processing, (3) fluid and chemical processing, and (4) vacuum research. Continuing activities include: ground based research, engineering and scientific analyses, advanced studies, and management of definition, design, development, and operation of materials processing experiments, apparatus, and payloads.

Theoretical, field, and laboratory experimental research will be done in the area of global weather, severe storms, and local weather. Efforts will be concentrated on improving our understanding of severe storms, mesoscale and global scale weather systems.

	Permanent Positions (Civil Service)
TECHNOLOGY UTILIZATION..	6

The Technology Utilization program transfers new knowledge and innovative technology, resulting from NASA R&D programs, to industry, medicine, and other public sector areas. MSFC personnel provide a source of technical skills necessary to accomplish technology transfer to the public sector.

AERONAUTICAL RESEARCH AND TECHNOLOGY..	6

The Aeronautical Research and Technology activities are concerned with aircraft operational safety. The major activities in **1984** will be to continue studies of atmospheric conditions having adverse effects on aircraft operation and design, to perform wind gust correlations, to investigate the dissipation of fog, and to continue studies and technology related to clear air turbulence. Studies will be conducted on the use of infrared lasers for measuring atmospheric flow structure.

SPACE RESEARCH AND TECHNOLOGY..	173

The major Space Research and Technology activities at MSFC are in chemical propulsion, materials, structures, dynamics, microelectronics, guidance and control, information systems, large solar array technology, and power systems technology. In **1984,** these efforts will focus on developing technology for high performance propulsion and power systems, and large space systems for the future.

Permanent Positions
(Civil Service)

CENTER MANAGEMENT AND OPERATIONS SUPPORT **520**

Center Management and Operations Support includes support and services being provided to all MSFC organizations which cannot be identified exclusively to a single program or project. The civil service personnel involved are:

Director and Staff - The Center Director, Deputy Director, and immediate staff, e.g., Comptroller, Legal, Patent Counsel, Equal Opportunity, Public Affairs, and Safety.

Management Support - The MSFC civil service personnel who provide information and control services supporting all levels of Center management, both program and functional. Specific functions include resources and financial management, program control, contracting and procurement, property management, personnel management, and management systems and analysis.

Operations Support - The MSFC civil service personnel who provide for the operation and maintenance of institutional facilities, buildings, systems and equipment, including those who manage or provide technical services such as automatic data processing, reliability and quality assurance, medical care, and photographic support.

RESOURCES REQUIREMENTS BY FUNCTION

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
	(Thousands of Dollars)			
I. PERSONNEL AND RELATED COSTS	132,480	132,529	139,352	139,103

Basis of Fund Requirements

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
A. Compensation and Benefits				
1. Compensation				
a. Permanent positions	116,519	115,707	121,376	120,827
b. Other than full time permanent positions	1,771	1,967	1,933	1,870
c. Overtime and other compensation	961	908	915	989
Subtotal, Compensation	119,251	118,662	124,224	123,686
2. Benefits	12,506	12,803	14,269	14,468
Subtotal, Compensation and Benefits	131,757	131,465	138,493	138,154
B. Supporting Costs				
1. Transfer of personnel	208	451	305	330
2. Personnel training	515	613	554	619
Subtotal, Supporting Costs	723	1,064	859	949
Total, Personnel and Related Costs	132,480	132,529	139,352	139,103

Explanation of Fund Requirements

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
	(Thousands of Dollars)			
A. Compensation and Benefits......................	131,757	131,465	138,493	138,154
1. Compensation	119,251	118,662	124,224	123,686
a. Permanent positions	116,519	115,787	121,376	120,827

The increase from the 1983 budget estimate to the 1983 current estimate is due primarily to the recent pay increases.

Basis of Cost for Permanent Positions

In 1984 the cost of permanent positions will be $120,827,000, a decrease of $549,000 from 1983. This decrease is calculated as follows:

Cost of permanent positions in 1983		121,376
Cost increases in 1984		+2,431
Within grade and career advances:		
Full year effect of 1983 actions	+1,158	
Partial year effect of 1984 actions	+1,139	
Full year effect of 1982 pay increases	+134	
Cost decreases in 1984		-2,980
Turnover savings and abolished positions:		
Full year effect of 1983 actions	-972	
Partial year effect of 1984 actions	-1,139	
One less paid day in 1984	-464	
Alteration in the method of calculation of salaries paid (P.L 97-253)	-405	
Cost of permanent positions in 1984		120,827

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of Dollars)		
b. Other than full-time permanent positions				
(1) cost...............................	1,771	1,967	1,933	1,870
(2) Workyears	165	183	168	163

The distribution of 1984 workyears is as follows:

Distribution of Other than Full-Time Permanent Workyears

Program	Workyears
Developmental programs...	73
Summer employment programs..	---
Youth opportunity programs..	47
Other temporary programs..	43
Total..	163

The decrease from the 1983 budget estimate to the 1983 current estimate reflects the effect of the 1982 pay raise offset by changes in the skill mix. The decrease in 1984 reflects continuing changes in the skill mix.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
c. Overtime and other compensation	961	908	915	989

The 1983 current estimate is slightly higher than the 1983 budget estimate due primarily to the 1982 pay raise. The increase in 1984 reflects anticipated increases in program activities.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of	Dollars)	
2. Benefits...................................	12,506	12,803	14,269	14,468

The following are the amounts of contribution by category:

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
Civil Service Retirement Fund.............	8,168	8,105	8,625	8,541
Employee life insurance....	347	361	365	385
Employee health insurance.....	2,763	2,287	3,022	3,028
Workmen's compensation.....................	1,152	2,003	1,151	1,151
FICA......................................	58	47	59	61
Medicare..................................	---	---	1,047	1,302
Other benefits............................	18	---	---	---
Total..................................	12,506	12,803	14,269	14,468

The 1983 current estimate is higher than the 1983 budget estimate due primarily to increased health benefits including Medicare, and the 1982 pay raise, offset by a decrease in the workmen's compensation cost. Workmen's compensation estimates for 1983 and 1984 are based on Department of Labor billings. The increase in 1984 reflects the full year effect of health benefits and the 1982 pay raise.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
B. Supporting Costs................................	723	1,064	859	949
1. Transfer of personnel....	208	451	305	330

The estimate provides for relocation costs, such as the expenses of selling and buying a home and the movement of household goods. The decrease from the 1983 budget estimate to the 1983 current estimate reflects changes in hiring plans. The increase in 1984 is primarily transportation rate increases.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of Dollars)		
2. Personnel training	515	613	554	619

The purpose of the MSFC training program is the development of skills and knowledge of civil service employees in order to more efficiently support MSFC's roles and missions. The benefits to be derived by NASA include: enhancement of scientific and engineering leadership in the scientific community; maintenance of a high degree of professional competency with the administrative and clerical work force; and development of needed skills and knowledge required in MSFC mission activities. The decrease from the 1983 budget estimate to the 1983 current estimate reflects a revised training plan consistent with program activity. The increase in 1984 reflects tuition cost increases.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
II. TRAVEL...	**2,942**	**3,413**	**3,481**	**3,720**

Summary of Fund Requirements

A. Program Travel.................................	2,696	3,150	3,189	3,401
B. Scientific and Technical Development Travel.. ...	47	63	53	59
C. Management and Operations Travel................	199	200	239	260
Total, Travel................................	2,942	3,413	3,481	3,720

Explanation of Fund Requirements

A. Program Travel.................................	2,696	3,150	3,189	3,401

Program travel is directly related to the accomplishment of the Center's mission and in 1984 is approximately 92 percent of the total MSFC travel. Travel requirements include those for ongoing programs such as the STS Operations, Spacelab, Inertial Upper Stage, Space Telescope, Spacelab Payloads, Space Science and Applications payloads and basic supporting research and technology, as well as support to the planning and definition of potential new program. The increase in 1984 is primarily due to increased cost of travel.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
	(Thousands of Dollars)			
B. Scientific and Technical Development Travel.....	47	63	53	59

Scientific and technical related travel permits employees to participate in meetings and technical seminars with representatives of the aerospace community. This participation allows them to maintain technical excellence, as they benefit from exposure to technological advances outside MSFC, as well as to present both accomplishments and concerns to their associates. These meetings are principally working panels convened to solve problems for the benefit of the Government. The decrease in FY 1983 current estimate from the 1983 budget estimate is due to partial application of the changes required by the appropriation reduction. The increase in 1984 will permit the same level of travel as in 1983.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
C. Management and Operations Travel...............	199	200	239	260

Management and operations travel is required for the direction and coordination of general management matters. It includes travel by managers in such areas as personnel, financial management, and procurement activities and travel of the Center's top management to NASA Headquarters and other NASA Centers. Local travel includes travel in and around the official station of the employer, including tolls, parking fees, taxis, and leased commercial vehicles. The increase from the 1983 budget estimate to the 1983 current estimate reflects increased management activity related to program development. The increase in 1984 will permit the same level of travel as in 1983.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of Dollars)		
III. OPERATION OF INSTALLATION.....................	36,637	41,762	41,119	43,840

Summary of Fund Requirements

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
A. Facilities Services.........................	16,971	18,774	19,027	21,216
B. Technical Services..........................	6,922	8,092	8,240	8,329
C. Management and Operations....................	12,744	14,896	13,852	14,295
Total, Operation of Installation..........	36,637	41,762	41,119	43,840

Explanation of Fund Requirements

Operation of Installation provides a broad range of services, supplies, and equipment in support of the Center's institutional activities. These are divided into three major functional areas: Facilities Services - the cost of maintaining and repairing institutional facilties and equipment, and the cost of custodial services and utilities; Technical Services - the cost of automatic data processing for management activities, and the cost of educational and informational programs and technical shops supporting institutional activities; and Management and Operations - the cost of administrative communications, printing, transportation, medical, supply, and related services.

The decrease reflected in the 1983 current estimate from the budget estimate is based primarily on less than anticipated rate increases in administrative communications. The 1984 budget estimate provides for projected increases in support contractor wage rates, supplies and materials, and maintenance and repair of equipment, along with anticipated utility rate increases.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of	Dollars)	
A. FACILITIES SERVICES	16,971	18,774	19,027	21,216

The Marshall Space Flight Center occupies 1,841 acres under a Department of the Army non-revocable use permit in a complex of science and engineering laboratories and special development and test facilities. The complex encompasses 3.8 million gross square feet of building space. The physical plant houses an average daily on-Center population of approximately 4,750 personnel.

Summary of Fund Requirements

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
1. Maintenance and Related Services	5,232	4,377	4,565	5,382
a. Facilities	4,280	3,655	3,720	4,566
b. Equipment	952	722	845	816
2. Custodial Services	3,479	3,793	3,841	4,312
3. Utility Services	8,260	10,604	10,621	11,522
Total Facilities Services	16,971	18,774	19,027	21,216

Explanation of Requirements

1. Maintenance and Related Services	5,232	4,377	4,565	5,382

This activity involves maintenance and operation of a total of 204 facilities, building, structures, and trailers, with 3.8 million square feet of floor area. Also involved are 1,841 acres of land, one million square yards of surfaced areas, and several special structures and systems. The 1983 budget estimate compared to the 1983 current estimate, reflects a shift of workyears to this sub-function to support utility control system operations partially offset by a change in the contractors funding plan. The increase in 1984 is due to expected increases in support contractor wage rate and full year funding of support contracts.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of Dollars)		
2. Custodial Services.........................	3,479	3,793	3,841	4,312

Custodial services include janitorial services, security services fire protection, trash removal, sanitary landfill operations, and related supplies and materials. Janitorial service is provided to about 3 million square feet of facility space. Security and fire protection services include 24-hour coverage of MSFC property, law enforcement, and motor vehicle registration and control. The increase from the 1983 budget estimate to the 1983 current estimate is due to support contractor wage rate increases and increases in Redstone Arsenal Support Activity (RASA) rates. The 1984 increase is also based on expected contractor and RASA rate increases.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
3. Utility Services...........................	8,260	10,604	10,621	11,522

This function provides for the cost of electricity, steam, natural gas, water, and sewage disposal service provided by the Army on a reimbursable basis. It also provides propane and burner fuel used to generate steam for heating and cooling. The increase in 1984 reflects expected utility rates.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of Dollars)		
B. TECHNICAL SERVICES	6,922	8,092	8,240	8,329

Summary of Fund Requirement

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
1. Automatic Data Processing	4,488	5,413	5,421	5,338
a. Equipment	618	1,249	1,314	882
b. Operations	3,870	4,164	4,107	4,456
2. Scientific and Technical Information	992	1,082	1,072	1,135
a. Library	882	942	939	1,006
b. Education and information	110	140	133	129
3. Shop and Support Services	1,442	1,597	1,747	1,856
Total, Technical Services	6,922	8,092	8,240	8,329

Explanation of Fund Requirements

1. Automatic Data Processing	4,488	5,413	5,421	5,338

Funds provide centralized systems analysis, programming, operations, and related computational services to meet management and administrative computing requirements. This category also includes maintenance of ADP equipment such as central site computers and related supplies and materials. Equipment maintained includes the Univac 1100/82 and supporting systems.

This function also provides for the development and utilization of computer techniques and systems programming of all digital computers and associated equipment at MSFC. Also included is associated auxilliary support equipment such as film processors, xerox microfiche printers, xerox forms copiers, punch card accounting machines and Univac 4020 terminals. This activity includes the operations of two large magnetic tape libraries; receipt, control, and distribution of program and data processing products; and testing and cleaning of magnetic tapes.

The decrease from the 1983 current estimate to the 1984 estimate is the result of the one-time purchase of a computer micrographics printer in 1983, partially offset by an increase in support contractor wage rates.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
	(Thousands of Dollars)			
2. Scientific and Technical Information........	992	1,082	1,072	1,135

This activity provides for the cost sharing operation of the Redstone Scientific Information Center (RSIC) library on Redstone Arsenal and other scientific and technical information services. Scientific information and library services are provided to MSFC employees and associated NASA contractor personnel. The RSIC contains a central collection of books and journals, periodicals, documents on microfilm and technical papers. Operation of the RSIC is under direction of a joint MSFC Redstone scientific information board.

These funds also provide for the preparation for publication of NASA technical manuscripts and related documents and MSFC's share of the operation of the MSFC Visitor Information Center located at the Alabama Space and Rocket Center. The 1984 estimate provides for the same level of service at expected rate increases.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
3. Shop and Support Services..................	1,442	1,597	1,747	1,856

These funds provide the Center with support in the areas of graphics, photographic services, and related supplies, materials, and equipment. The increase between the 1983 current estimate and the budget estimate is due to unanticipated requirement for replacement of photographic equipment. The 1984 increase is due to expected increases in support contractor wage rates.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of Dollars)		
C. MANAGEMENT AND OPERATIONS......................	12,744	14,896	13,852	14,295

Summary of Fund Requirements

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
1. Administrative Communications..............	3,835	4,802	3,887	4,507
2. Printing and Reproduction....................	423	538	450	431
3. Transportation............................	3,002	4,975	4,619	3,810
4. Installation Common Services................	5,484	4,581	4,896	5,547
Total, Management and Operations...........	12,744	14,896	13,852	14,295

Explanation of Fund Requirements

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
1. Administrative Communications..............	3,835	4,802	3,887	4,507

Communications support for MSFC consists of local telephone service, long distance telephone service and various kinds of other non-telephone communications. The MSFC central exchange provides local telephone service. Long distance telephone service is provided by GSA. Included are such items as long distance commercial tolls and the autodin network for ordering supplies and materials. Also included are the costs of leased lines for the teleconferencing network. In addition, these funds provide for the use of Weeden Mountain radio transmission facilities, support of the emergency warning system, and operation of MSFC's fire surveillance system. Also provided is the GSA teletype system; the Western Union teletype system; and overseas telegrams and cable system. The decrease in the 1983 current estimate from the budget estimate is based on less than anticipated rate increases, and the deferral of replacement equipment purchases. The 1984 estimate reflects rate increases in local services and long distance tolls.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
	(Thousands of Dollars)			
2. Printing and Reproduction	423	538	450	431

A portion of MSFC's printing and reproduction requirements are met by an on-site reproduction plant operated by MSFC civil service personnel. In addition to the on-site reproduction plant, MSFC must also purchase reproduction services from the Government Printing Office, the Army, and private firms. This purchased printing is an overflow or special requirement that cannot be handled within the on-site capability. The decrease in the 1983 current estimate and the 1984 estimate from the 1983 budget estimate reflects an anticipated reduction in printing requirements based on 1982 experience.

3. Transportation	3,002	4,975	4,619	3,810

The transportation function at MSFC includes operation and maintenance of vehicles and aircraft, transportation of related supplies and materials, and purchases of transportation equipment. Included is the maintenance of general purpose vehicles, material handling equipment, general special purpose trailers and vehicles, cranes, tractors, generators and welders. Freight charges for shipment of materials and equipment by both surface and air transportation are also included. The decrease from the 1983 budget estimate to the 1983 current estimate reflects less than anticipated increases in fuel rates. The decrease in the 1984 budget is primarily due to the one-time replacement of the twenty-year old Queen Air aircraft in 1983, partially offset by expected support contractor wage rate increases.

4. Installation Common Services	5,484	4,581	4,896	5,547

This activity provides administrative support to Center management and staff activities, medical services, and various other installation support services.

Center management and staff functions include patent counsel services, tort claims, and equal opportunity activities. Medical services provides occupational medicine and environmental health services for the maintenance and improvement of employee health at MSFC, with emphasis on prevention, diagnosis, treatment, and care of illnesses and injuries.

Installation support services include maintenance and repair of office equipment, equipment rental, acquisition of supplies and mateials and other miscellaneous services such as: (1) receiving supplies, materials, and equipment; (2) distributing supplies, materials, equipment, and program–critical hardware; (3) preparing supplies, materials, and equipment for shipment; and (4) warehousing of raw materials.

Also provided are such services as the disposal of toxic waste, inspection of hazardous cargo prior to entry to Redstone Arsenal; receipt, storage, and issuance services for hazardous substances; minor services such as postage, and acquisition of supplies and materials.

The increase from the 1983 budget estimate to the 1983 current estimate reflects primarily higher costs for maintenance and repair of equipment than planned and higher equipment rental rates than previously expected. The increase in the 1984 budget is primarily for equipment replacement, for the replenishment of supplies and materials inventories, plus the expected increase in support contractor wage rates.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
GEORGE C. MARSHALL SPACE FLIGHT CENTER

OFFICE Of DIRECTOR

	FY 83	FY 84
SES	5	5
GS-16	0	0
GS-15	0	0
GS-14	0	0
ALL OTHER GS	4	4
WAGE BOARD	0	0
TOTAL PERMANENT	9	9

MSFC SUMMARY

	FY 83	FY 84
SES	67	67
GS-16	1	1
GS-15	140	140
GS-14	510	510
ALL OTHER GS	2446	2446
WAGE BOARD	122	122
TOTAL PERMANENT	3266	3266

EXECUTIVE STAFF

	FY 83	FY 84
SES	0	0
GS-16	0	0
GS-15	0	0
GS-14	2	2
ALL OTHER GS	7	7
WAGE BOARD	0	0
TOTAL PERMANENT	9	9

SAFETY OFFICE

	FY 83	FY 84
SES	0	0
GS-16	0	0
GS-15	1	1
GS-14	3	3
ALL OTHER GS	21	21
WAGE BOARD	0	0
TOTAL PERMANENT	25	25

PUBLIC AFFAIRS OFFICE

	FY 83	FY 84
SES	0	0
GS-16	0	0
GS-15	0	0
GS-14	1	1
ALL OTHER GS	17	17
WAGE BOARD	0	0
TOTAL PERMANENT	18	18

CHIEF COUNSEL

	FY 83	FY 84
SES	1	1
GS-16	0	0
GS-15	1	1
GS-14	1	1
ALL OTHER GS	9	9
WAGE BOARD	0	0
TOTAL PERMANENT	12	12

CENTER COMPTROLLER

	FY 83	FY 84
SES	1	1
GS-16	0	0
GS-15	2	2
GS-14	8	8
ALL OTHER GS	89	89
WAGE BOARD	0	0
TOTAL PERMANENT	100	100

PERSONNEL OFFICE

	no	FY 84
SES	0	0
GS-16	0	0
GS-15	1	1
GS-14	4	4
ALL OTHER GS	53	53
RAM BOARD	0	0
TOTAL PERMANENT	58	58

EQUAL OPPORTUNITY OFFICE

	FY 83	FY 84
SES	-	-
GS-16	-	-
GS-15	1	1
GS-14	0	0
ALL OTHER GS	6	6
WAGE BOARD	0	0
TOTAL PERMANENT	7	7

SHUTTLE PROJECTS OFFICE

	FY 83	IVY
SES	7	7
GS-16	0	0
GS-15	21	21
GS-14	54	54
ALL OTHER GS	150	150
WAGE BOARD	0	0
TOTAL PERMANENT	232	232

MICHOUD ASSEMBLY FACILITY

	no	FY 84
SES	(0)	(0)
GS-16	(0)	(0)
GS-15	(2)	(2)
GS 14	(2)	(2)
ALL OTHER GS	(18)	(18)
WAGE BOARD	(0)	(0)
TOTAL PERMANENT	(22)	(22)

SPECIAL PROJECTS OFFICE

	FY 83	FY 84
SES	2	2
GS-16	0	0
GS-15	1	1
GS-14	8	8
ALL OTHER GS	16	16
WAGE BOARD	0	0
TOTAL PERMANENT	27	27

SPACE TELESCOPE PROJECT OFFICE

GS-16		
GS-15		
GS-14	18	18
ALL OTHER	24	24
WAGE Duo	0	0
TOTAL PERMANE	42	42

MATERIALS PROCESSING IN SPACE PROJECTS OFFICE

	FY 83	FY 84
SES	0	0
GS-16	0	0
GS-15	0	0
GS-14	1	1
ALL OTHER GS	0	0
WAGE BOARD	0	0
TOTAL PERMANENT	1	1

SPACELAB PROGRAM OFFICE

	FY 83	FY 84
SES	2	2
GS-16	0	0
GS-15	3	3
GS-14	17	17
ALL OTHER GS	19	19
WAGE BOARD	0	0
TOTAL PERMANENT	41	41

SPACELAB PAYLOAD PROJECT OFFICE

	FY 83	FY 84
SES	5	5
GS-16	0	0
GS-15	10	10
GS-14	20	20
ALL OTHER GS	51	51
WAGE BOARD	0	0
TOTAL PERMANENT	86	86

PROGRAM DEVELOPMENT

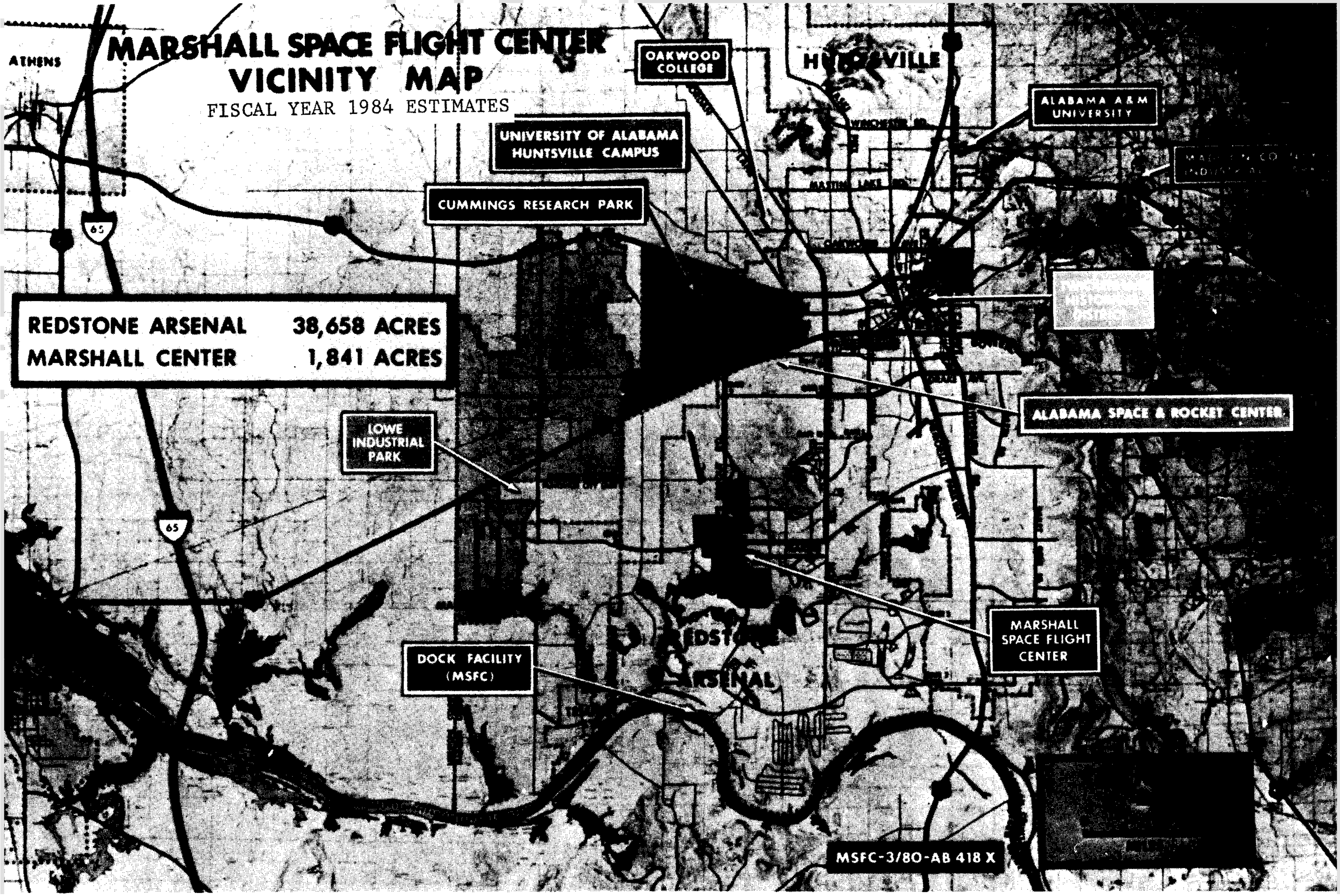
	FY 83	FY 84
SES	5	5
GS-16	0	0
GS-15	18	18
GS-14	40	40
ALL OTHER GS	108	108
WAGE BOARD	0	0
TOTAL PERMANENT	171	171

SCIENCE AND ENGINEERING

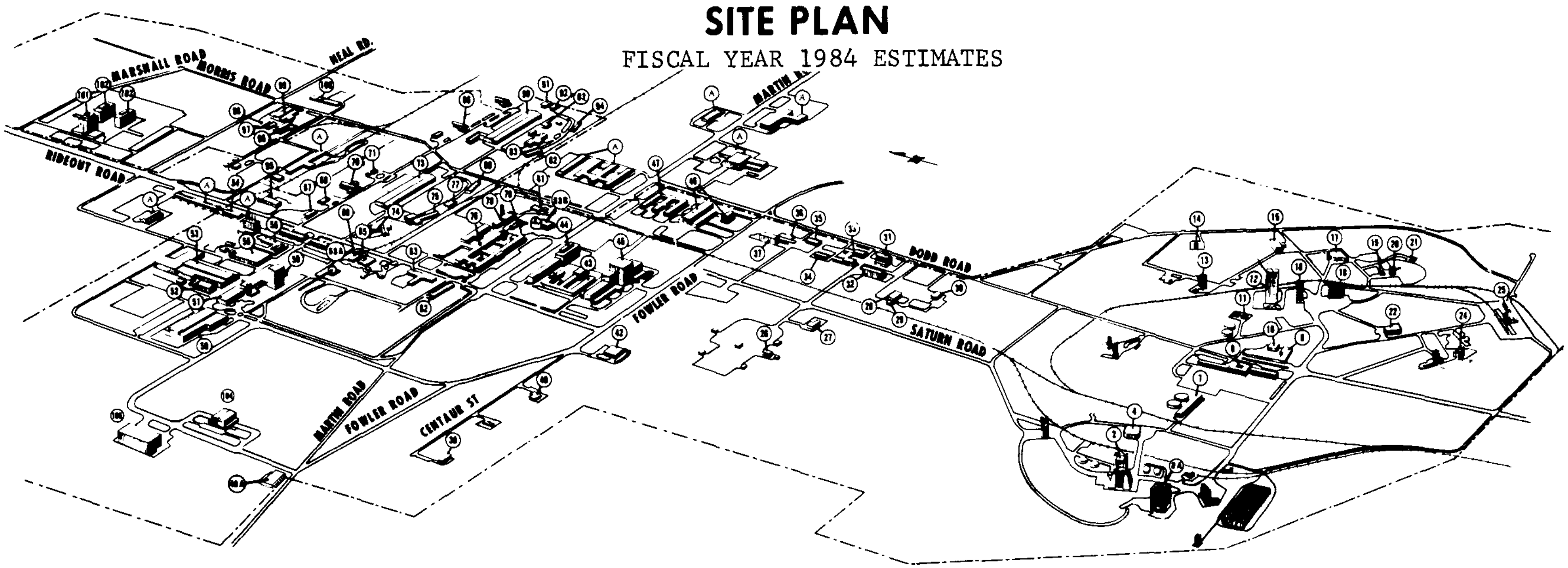
	FY 83	FY 84
SES	25	25
GS-16	1	1
GS-15	72	72
GS-14	293-	293
ALL OTHER GS	1426	1426
WAGE BOARD	87	87
TOTAL PERMANENT	1904	1904

ADMINISTRATION & PROGRAM SUPPORT

	FY 83	FY 84
SES	2	2
GS-16	0	0
GS-15	12	12
GS-14	30	30
ALL OTHER GS	447	447
WAGE BOARD	43	43
TOTAL PERMANENT	534	534


MARSHALL SPACE FLIGHT CENTER
VICINITY MAP
FISCAL YEAR 1984 ESTIMATES
ATHENS
HUNTSVILLE
OAKWOOD COLLEGE
ALABAMA A&M UNIVERSITY
UNIVERSITY OF ALABAMA HUNTSVILLE CAMPUS
CUMMINGS RESEARCH PARK
REDSTONE ARSENAL 38,658 ACRES
MARSHALL CENTER 1,841 ACRES
LOWE INDUSTRIAL PARK
ALABAMA SPACE & ROCKET CENTER
MARSHALL SPACE FLIGHT CENTER
DOCK FACILITY (MSFC)
REDSTONE ARSENAL
65
MSFC-3/80-AB 418 X

MARSHALL SPACE FLIGHT CENTER
SITE PLAN
FISCAL YEAR 1984 ESTIMATES



HEADQUARTERS AREA

95	4207	COMMUNICATIONS FACILITY
96	4241	SHOP AND STORAGE BUILDING
97	S-4244	STORAGE BUILDING
98	S-4251	EQUIPMENT SHED
99	4250	OFFICE AND SHOP BUILDING
100	4249	OFFICE BUILDING
101	4200	OFFICE BUILDING
102	4202	OFFICE BUILDING
103	4201	OFFICE BUILDING

LAB AND SUPPORT AREA

38	4628	CRYOGENIC TESTING FACILITY
40	4623	LABORATORY BUILDING
42	4605	NON-DESTRUCTIVE EVALUATION LABORATORY
43	4612	MATERIALS LABORATORY
44	4610	OFFICE AND ENGINEERING BUILDING
45	4619	STRUCTURES AND MECHANICS LABORATORY
46	4650	SHOP AND CALIBRATION LABORATORY
47	4663	COMPUTER FACILITY
49A	4740	WATER POLLUTION CONTROL FACILITY
50	4708	ENGINEERING AND DEVEL L
51	4760	SURFACE TREATME T FAC
52	S-4706	NEUTRAL BUOYANCY FACILITY
53	4705	FABRICATION AND MACHINE SHOP
53A	4775	HIGH REYNOLDS FACILITY
53B	4467	CELESTIAL & OPTICAL SE FACILITY
54	723	TRAINING FACILITY
55	4711	DWELOPMMAL PROCESSES LABORATORY
56	4712	OFFICE BUILDING
59	4707	SHOP AND ASSEMBLY BUILDING
62	S-4747	AIR COMPRESSOR BUILDING
63	4746	CALIBRATION LABORATORY
65	4732	BISONIC WIND TUNNEL FACILITY
66	4733	IMPULSE BASE FLOW FACILITY
61	4306	OFFICE BUILDING
68	4312	OFFICE BUILDING
70	4313	SHOP BUILDING
71	4332	ENVIRONMENTAL TEST LABORATORY
13	4471	STORACE AND OFFICE BUILDING
74	4485	OFFICE BUILDING
75	4491	OFFICE AND LABORATORY BUILDING
16	4487	LABORATORY AND OFFICE BUILDING
11	S-4479	STORAGE SHED
78	4476	ENVIRONMENTAL TEST FACILITY
19	S-4436	AUT MATION CHECKOUT BUILDI
80	4492	ELE TRICAL SYSTEMS LABORATO BUILDING
81	4475	ARDOUS OPERATIONS LABO ORY
82	4493	P AND STORAGE BUILDING
83	4483	VEHICLE MAINTENANCE SHOP
86	4353	PHOTO LAB
90	4481	SPACE SCIENCES LABORATORY
91	S-4498	STORAGE BUILDING
92	S-4499	STORAGE BUILDING
93	4482	TRANSPORTATION SUPPORT BUILDING
94	4494	CENTER ACTIVITIES BUILDING
104	4752	MULTIPURPOSE HIGH BAY FACILITY
105	4755	HIGH BAY ASSEMBLY FACILITY

TEST AREA

WEST AREA

2	4670	PROPULSION & STRUCTURALTEST FACILITY
4	4674	BLOCKHOUSE
7	4667	WMP HOUSE
8	4666	OFFICE BUILDING
8A	4699	STRUCTURALTEST FACILITY

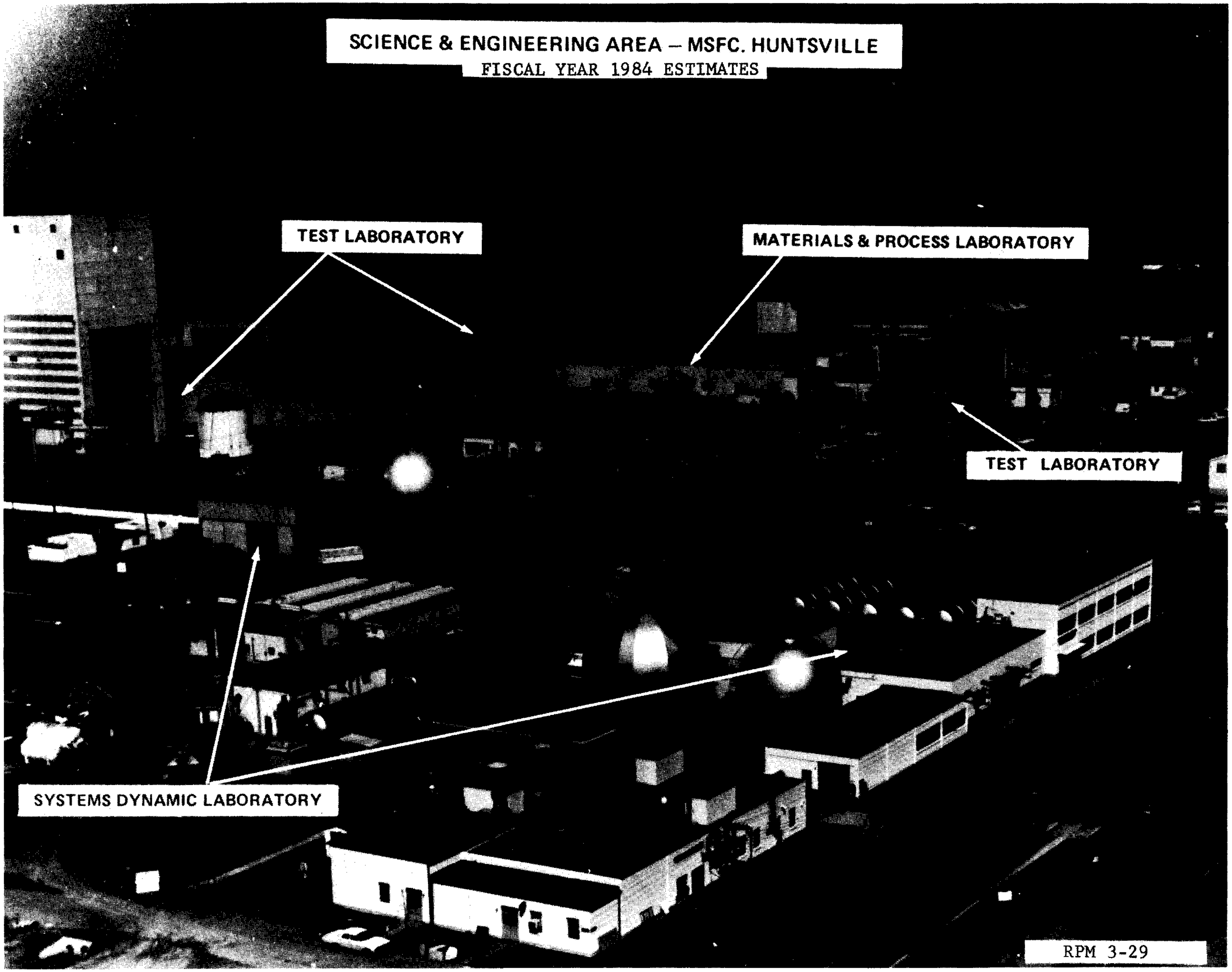
EAST AREA

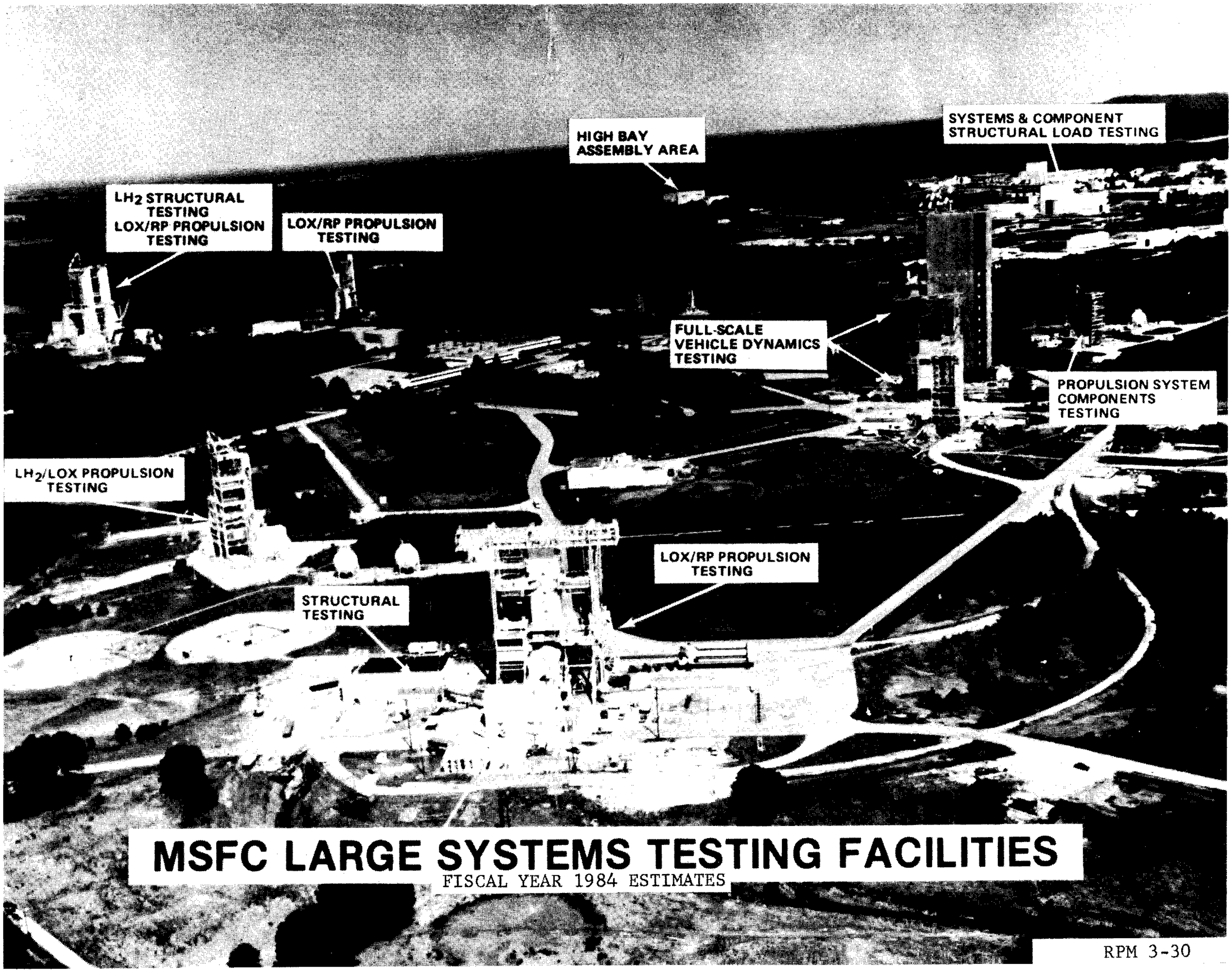
9	4566	DOCUMENTATION REPOSITORY
10	4548/4549	PUMP AND BOILER HOUSE
11	S-45	DEIONIZED WATER PLANT
12	4550	STRUCTURAL TEST FACILITY
13	4522	PROPUSION SYSTEMS COMPONENT TEST STAND
14	4530	PROPUSION SYSTEMS COMPONENT TEST STAND
15	4561	SHOP AND LABORATORY BUILDING
16	4557	STRUCTURAL TEST FACILITY
11	4583	TEST AND DATA RECORDING FACILITY
18	4548	PROPUSION SYSTEMS COMPONENT TEST FACILITY
19	S-4539	TEST STAND SUPPORT BUILDING
20	4540	MODEL PROPULSION SYSTEMS TEST STAND (ACOUSTIC)
21	4511	TEST STAND CONTROL BUILDING
22	4570	BLOCKHOUSE AND CABLE TUNNELS
24	4514	PROPUSION SYSTEMS TEST STAND
25	4572	PROPULSION AND STRUCTURALTEST FACILITY

TEST SUPPORT AREA

26	4646	OFFICE BUILDING
27	4648	HIGH PRESSURE TEST FACILITY
28	S-4659	HP GN_2 FACILITY
29	S-4660	BOILER PUNT
30	S-4647	COMPRESSOR BUILDING
31	S-4655	MULTIPURPOSE HIGH BAY FACILITY
32	S-4656	HYDRAULIC EQUIPMENT DEVELOPMENT FACILITY
33	S-4653	COMPONENTS SERVICE BUILDING
34	4678	OFFICE AND STORAGE BUILDING
35	S-4654	OFFICE BUILDING
36	S-4651	SHOP BUILDING
31		MULTIPURPOSE HIGH BAY FACILITY

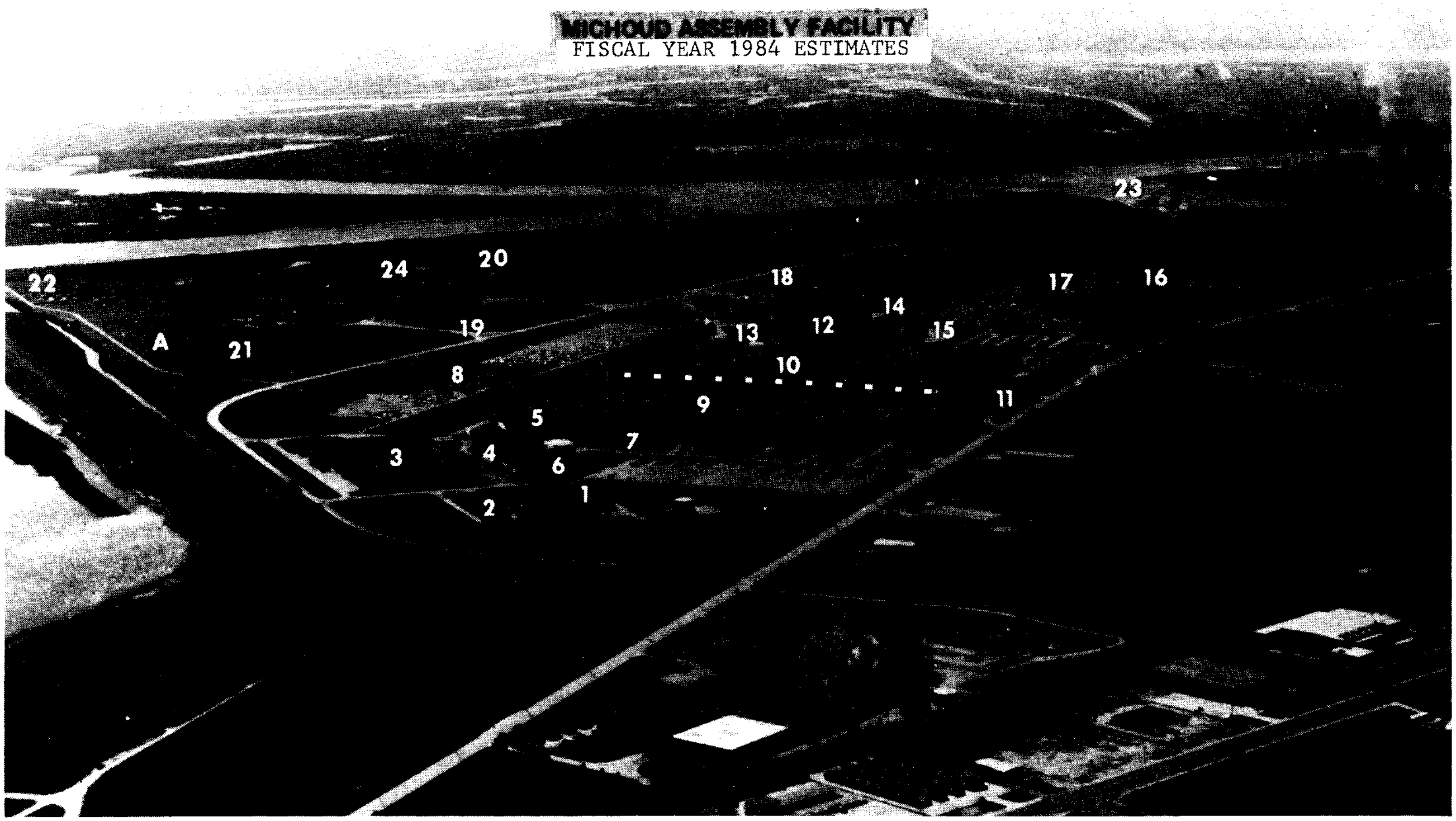
FISCAL YEAR 1984 ESTIMATES


SCIENCE & ENGINEERING AREA – MSFC. HUNTSVILLE
FISCAL YEAR 1984 ESTIMATES
TEST LABORATORY
MATERIALS & PROCESS LABORATORY
TEST LABORATORY
SYSTEMS DYNAMIC LABORATORY
RPM 3-29



MSFC LARGE SYSTEMS TESTING FACILITIES

FISCAL YEAR 1984 ESTIMATES



1. MAINTENANCE SUPPLY	**9.** FAB AREA	**17.** CAFETERIA
2. HAZARDOUS MATLS STORAGE	**10.** FABAREA	**18.** CONTRACTOR SERVICES BLDG.
3. COMPONENT SUPPLY	**11.** ENGINEERING BUILDINGS	**19.** TEST & CHECK OUT
4. BOILER PLANT & FUEL TANKS	**12.** VERT ASSY & HYDROSTATIC TEST	20. SALVAGE YARD
5. BATTERY CHARGING	13. SYSTEMS ENGINEERING BLDG.	**21.** HIGH PRESSURE TEST FACILITY
6. COOLING TOWER	**14.** HANGAR	**22.** MAIN PUMPING STATION
7. LABORATORY	**15.** MAINTENANCE	**23.** BARGE DOCK
8. CHEMICAL WASTE RESERVOIR	**16.** ENGINEERING & OFFICE BLDG.	**24.** PNEUMATIC TEST FACILITY

NATIONAL SPACE
TECHNOLOGY
LABORATORIES

RESEARCH AND PROGRAM MANAGEMENT

FISCAL YEAR 1984 ESTIMATES

NATIONAL SPACE TECHNOLOGY LABORATORIES

DESCRIPTION

The National Space Technology Laboratories is located in southwest Mississippi, approximately 50 miles northeast of New Orleans, Louisiana. Total land area is 138,807 acres of which 13,480 acres make up the actual installation all of which is owned by NASA. The remaining 125,327 acres are held as a buffer zone. In the buffer zone, 7,162 acres are owned by NASA and 118,165 acres are under restrictive easements. The installation has deep water access via the Pearl River and the Intracostal waterway. Capital investment for the National Space Technology Laboratories, as of September 30, 1982, was $309,306,000.

CENTER ROLES AND MISSIONS

The National Space Technology Laboratories (NSTL), formerly the Mississippi Test Facility, is NASA's prime static test facility for large liquid propellant rocket engines and propulsion system. The redesignation of MTF to the NSTL in June 1974 recognized the emerging role of the installation in space and environmental technology efforts.

NSTL is presently engaged in development and acceptance testing of the Space Shuttle Main Engines and Main Propulsion System development testing. NSTL also conducts applied research and development in the fields of remote sensing, environmental sciences, and other selected applications programs. NSTL manages the installation and, through interagency agreements, provides support and maintains full utilization of all facilities by NASA and co-located elements of other executive agencies. These agencies are engaged in compatible research, development, and operational activities. They include the Department of Defense, the Department of Interior, the Department of Commerce, the Environmental Protection Agency, the Department of Transportation, the State of Mississippi, and the State of Louisiana. The principal roles are:

Space Shuttle: - Provides, maintains and manages the facilities and the related capabilities required for the continued development and acceptance testing of the Space Shuttle Main Engines.

Space Applications: - Conducts fundamental and applied research, develops advanced airborne sensors and data/information systems, and conducts test and evaluation activities of remote sensing technology in the areas of renewable and nonrenewable resources.

Support to Tenant Agencies: - Provides technical and institutional support to resident agencies.

SUMMARY OF RESOURCES REQUIREMENTS

Funding Plan by Function

		1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
			(Thousands of Dollars)		
I.	Personnel and Related Costs..................	3,984	4,020	4,474	4,489
11.	Travel.......................................	123	147	142	151
III.	Operation of Installation.....................	2,497	2,085	1,716	4,662
	A. Facilities Services.......................	(777)	(643)	(516)	(2,659)
	B. Technical Services........................	(171)	(160)	(176)	(217)
	C. Management and Operations..................	(1,549)	(1,282)	(1,024)	(1,786)
	Total, fund requirements.......	6,604	6,252	6,332	9,302

Distribution of Permanent Positions by Program

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
Direct Positions				
Space Transportation System	5	5	5	5
Space transportation capability development	5	5	5	5
Space Science and Applications	39	40	40	40
Space applications	39	40	40	40
Subtotal, direct positions	44	45	45	45
Center Management and Operations Support	60	59	59	59
Total, permanent positions	104	104	104	104

PROGRAM DESCRIPTION

	Permanent Positions (Civil Service)
SPACE TRANSPORTATION CAPABILITY DEVELOPMENT	5

In 1984, the National Space Technology laboratories will continue to provide, maintain, and manage the facilities and the related capabilities required for development and acceptance testing of the Space Shuttle Main Engines.

	Permanent Positions (Civil Service)
SPACE APPLICATIONS..	40

In 1984, the NSTL's Earth Resources Laboratory will continue to:

-- Conduct research investigations in the application of remotely sensed data. This research activity uses existing aircraft and satellite programs as a basic source of remotely sensed data in conjunction with surface data to develop techniques and procedures for practical applications.

-- Conduct applied research investigations for the application of new sensor data to priority information requirements of national concern in the areas of agricultural productivity, geological explorations, and land resources management including studies for aligning appropriate sensor technology with application disciplinary requirements.

-- Promote the effective transfer of applications technology as well as to reduce systems cost, and improve compatibility with other information sources and products.

-- Conduct research and development applications in nonremote sensing primarily in such areas as environmental system development and closed ecosystems development.

CENTER MANAGEMENT AND OPERATIONS SUPPORT..	59

Center Management and Operations Support is defined as that support or services being provided to all NSTL organizations which cannot be identified exclusively to a single program or project. The civil service personnel involved are:

Manager and Staff - The Installation Manager, Deputy Manager, and immediate staff, e.g., Legal, Equal Opportunity, and Public Affairs.

Management Support - The part of the NSTL civil service workforce who provide information and control services supporting all levels of Center management, both program and functional. Specific functions include resources and financial management, program control, contracting and procurement, property management, personnel management, and management systems and analysis.

Operations Support - The NSTL civil service personnel who provide for the operation and maintenance of institutional facilities, buildings, systems and equipment, including those who manage or provide technical services such as automatic data processing, reliability and quality assurance, medical care, and photographic support.

RESOURCE REQUIREMENTS BY FUNCTION

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of Dollars)		
I. PERSONNEL AND RELATED COSTS....................	3,984	4,020	4,474	4,489

Summary of Fund Requirements

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
A. Compensation and Benefits				
1. Compensation				
a. Permanent positions.....................	3,415	3,456	3,656	3,643
b. Other than full-time permanent positions	204	178	284	297
c. Overtime and other compensation.........	5	8	14	15
Subtotal, Compensation..................	3,624	3,642	3,954	3,955
2. Benefits..................................	345	345	482	494
Subtotal, Compensation and Benefits.....	3,969	3,987	4,436	4,449
B. Supporting Costs				
1. Transfer of personnel......................	---	15	25	25
2. Personnel training.........................	15	18	13	15
Subtotal, Supporting Costs..	15	33	38	40
Total, Personnel and Related Costs..........	3,984	4,020	4,474	4,489

Explanation of Fund Requirements

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of Dollars)		
A. Compensation and Benefits......................	3,969	3,987	4,436	4,449
1. Compensation	3,624	3,642	3,954	3,955
a. Permanent positions	3,415	3,456	3,656	3,643

The current estimate for **1983** reflects a change from the **1983** budget estimate due to the **1982** pay increase.

Basis of Cost for Permanent Positions

In **1984**, the cost of permanent positions will be **$3,643,000**, a decrease of **$13,000** from **1983**. The decrease is calculated as follows:

Cost of permament positions in 1983...		3,656
Cost increase in 1984..		+82
Within grade and career advances:		
Full year effect of 1983 actions...........................	+20	
Partial year effect of 1984 actions........................	+37	
Full year effect of 1983 pay increases.......................	+25	
Cost decreases in 1984..		-95
Turnover savings and abolished positions:		
Full year effect of 1983 actions...........................	-22	
Partial year effect of 1984 actions........................	-47	
One less paid day in 1984......................................	-14	
Alteration in the method of calculation of salaries paid (PL 97-253)......................................	-12	
Cost of permanent positions in 1984...		3,643

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of Dollars)		
b. Other than full-time permanent positions				
1. Cost................................	204	178	284	297
2. Workyears	15	18	18	18

The distribution of 1984 workyears is as follows:

Distribution of Other than Full-Time Permanent Workyears

Program	Workyears
Developmental programs..	5
Summer employment programs..	2
Youth opportunity programs..	1
Other temporary programs..	10
Total...	18

The increase from the 1983 budget estimate to the 1983 current estimate is a result of the 1982 pay increase as well as a change in the temporary skill mix. The 1984 increase is the full year cost of the 1982 pay raise.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
c. Overtime and other compensation.........	5	8	14	15

The increase from the 1983 budget estimate to the 1983 current estimate is necessary to meet management and administrative requirements in such areas as procurement and financial management consistent with recent experience. This requirement will continue through 1984.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of Dollars)		
2. Benefits	345	345	482	494

The following are the amounts of contribution by category:

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
Civil Service Retirement Fund	238	249	272	271
Employee life insurance	10	11	11	11
Employee health insurance	92	80	150	158
FICA	5	5	7	8
Medicare	---	---	42	46
Total	345	345	482	494

The increase from the 1983 budget estimate to the 1983 current estimate results from the increased health benefits cost and the Medicare contributions as well as the 1982 pay increase. The increase in 1984 is the full year effect of these changes.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
B. Supporting Costs	15	33	38	40
1. Transfer of personnel	---	15	25	25

The estimates for 1983 and 1984 are based on projected hiring plans.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
2. Personnel training	15	18	13	15

The personnel training program continues to develop the skills and knowledge of NSTL employees in order to more efficiently support NSTL roles and missions, primarily through upward mobility training for women and minorities, and Equal Employment Opportunity seminars.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of Dollars)		
II. TRAVEL....................	123	147	142	151

Summary of Fund Requirements

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
A. Program Travel..................................	72	88	81	87
B. Scientific and Technical Development Travel.. ...	3	3	3	3
C. Management and Operations Travel................	48	56	58	61
Total, Travel.................................	123	147	142	151

Explanation of Fund Requirements

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
A. Program Travel.................................	72	88	81	87

Program travel requirements are directly related to the accomplishment of the Laboratories' mission, and will mainly be in support of Space Science and Applications Programs. Program travel will account for about 60 percent of total travel in 1984. The 1984 budget estimate reflects expected transportation cost rates.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
B. Scientific and Technical Development Travel.....	3	3	3	3

Scientific and technical development travel will permit employees to participate in meetings and technical seminars with other representatives of the aerospace community. This participation allows them to retain their technical competency and gain awareness of technological advances outside NSTL as well as to present both accomplishments and concerns to their associates. Many of the meetings are working panels convened to solve certain problems for the benefit of the Government.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of Dollars)		
C. Management and Operations Travel................	48	56	58	61

Management and operations travel is used for the direction and coordination of general management matters. It includes travel in such areas as personnel, financial management, and procurement activities as well as travel of the laboratories' top management to NASA Headquarters and other NASA Centers. The increase from the 1983 budget estimate to the 1983 current estimate and the 1984 increase reflect expected transportation cost rates.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
III. OPERATION OF INSTALLATION......................	2,497	2,085	1,716	4,662

Summary of Fund Requirements

A. Facilities Services.........................	777	643	516	2,659
B. Technical Services..........................	171	160	176	217
C. Management and Operations..................	1,549	1,282	1,024	1,786
Total, Operation of Installation..........	2,497	2,085	1,716	4,662

Explanation of Fund Requirements

Operation of Installation provides a broad range of services, supplies, and equipment in support of the Center's institutional activities. These are divided into three major functional areas: Facilities Services, the cost of maintaining and repairing institutional facilities and equipment, and the cost of custodial services and utilities; Technical Services, the cost of automatic data processing for management activities, and the cost of educational and informational programs and technical shops supporting institutional activities; and Management and Operations, the cost of administrative communications, printing, transportation, medical, supply and related services.

Decreased funding from the 1983 budget estimate to the 1983 current estimate is due to rephasing of the support contractor funding plan. The 1984 estimate reflects a realignment of institutional services provided to the Space Shuttle Engine Test complex, as well as full year funding of support contracts.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of Dollars)		
A. FACILITIES SERVICES............................	777	643	516	2,659

The NSTL covers 138,807 acres of grounds, and includes a complex of facilities which are comprised of laboratories, offices, and rocket engine test facilities. The complex encompasses some 1,247,031 gross square feet of building space. This physical plant supports an average daily on-site population of 3,000. Many of the test facilities are utilized on schedules involving more than one shift operation and operations during off-peak hours.

Summary of Fund Requirements

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
1. Maintenance and Related Services.............	225	150	95	170
2. Custodial Services..........................	168	125	75	267
3. Utility Services...........................	384	368	346	2,222
Total, Facilities Services...............	777	643	516	2,659

Explanation of Fund Requirements

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
1. Maintenance and Related Services...........	225	150	95	170

This activity provides for the modifications and alterations of facilities and movement of personnel and equipment of the Earth Resources Laboratory (ERL) and equipment purchases for the ERL. The decrease from the 1983 budget estimate to the 1983 current estimate is due to a rephasing of the support contract funding plan, and the 1984 increase is due to the full year funding of such contracts.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of Dollars)		
2. Custodial Services........................	168	125	75	267

Provides for NASA's share of security guard services, janitorial services and fire protection services by the NSTL institutional support services contractor. The decrease from the 1983 budget estimate to the 1983 current estimate is due to rephasing of the support contractor funding plan. The increase in 1984 is the realignment of security support for the Space Shuttle Engine Test complex, and the full year funding of support contracts.

3. Utility Services...........................	384	368	346	2,222

Provides for the purchase of the two utility commodities; electricity from the Mississippi Power Company and natural gas from the United Gas Pipe Line Company. Natural gas is the primary heating fuel used at NSTL. Also provided is NASA's share of the operation of the utility distribution and control systems, water wells and sewage systems.

The increase in the 1984 budget estimate reflects the realignment of energy utilities for the Space Shuttle Test complex.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of Dollars)		
B. TECHNICAL SERVICES	171	160	176	217

Summary of Fund Requirements

1. Automatic Data Processing	3	4	4	5
2. Scientific and Technical Information	38	70	128	117
a. Library	3	3	3	4
b. Education and information	35	67	125	113
3. Shop and Support Services	130	86	44	95
Total, Technical Services	171	160	176	217

Explanation of Fund Requirements

1. Automatic Data processing	3	4	4	5

Provides supplies and materials in support of the Earth Resources Laboratory's ADP requirements.

2. Scientific and Technical Information	38	70	128	117

Provides books, periodicals, and other technical reports required by the Earth Resources Laboratory, and NASA's share of upgrading and operating the NSTL Visitor Information Center (VIC). The VIC upgrading program, which begins in 1983 in response to public interest, will continue into 1984 to prepare for the expected influx of visitors as a result of the 1984 New Orleans World's Fair.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
	(Thousands of Dollars)			
3. Shop and Support Services.................	130	86	44	95

Provides for NASA's share of such technical services as reliability and quality assurance, safety, photography and graphics. The decrease in the 1983 current estimate reflects a rephasing of support contract funding plan, and the increase in 1984 reflects the full year funding of such contracts.

C. MANAGEMENT AND OPERATIONS.......................	1,549	1,282	1,024	1,786

Summary of Fund Requirements

1. Administrative Communications............,...	703	551	516	834
2. Printing and Reproduction..................	70	45	24	51
3. Transportation.............................	701	576	384	790
4. Installation Common Services...............	75	110	100	111
Total, Management and Operations..........	1,549	1,282	1,024	1,786

Explanation of Fund Requirements

1. Administrative Communications..............	703	551	516	834

Provides for NASA's share of the local telephone service, ETS, long distance tolls, and operation and maintenance of the on-site communications equipment and switchboard. The increase in the 1984 budget estimate reflects the realignment of communication support to the Space Shuttle Engine Test complex.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of Dollars)		
2. Printing and Reproduction..................	70	45	24	51

Provides for printing and reproduction services in support of the Earth Resources laboratory and the local house organ. The decrease from the 1983 budget estimate to the 1983 current estimate reflects a rephasing of the support contract funding plan, and the 1984 increase reflects the full year funding of such contracts.

3. Transportation.............................	701	576	384	790

This estimate includes local transportation for the NSTL staff and the support contractors, as well as freight costs, government bills of landing, air freight, other general shipments, and related transportation costs. The 1983 current estimate decrease is a rephasing of the support contract funding. The 1984 budget estimate reflects realignment of vehicle support provided to the Space Shuttle Engine Test complex.

4. Installation Common Services..............	75	110	100	111

Provides supplies, materials and equipment for the Earth Resources Laboratory. The increase from the 1983 current estimate to the 1984 budget estimate reflects expected cost escalation for the same level of service.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
NATIONAL SPACE TECHNOLOGY LABORATORIES

NSTL SUMMARY STAFFING

	FY83	FY84
SES	3	3
cs-15	4	4
cs-14	12	12
All other GS	85	85
TOTAL PERMANENT	104	104

OFFICE OF THE MANAGER

	FY83	FY84
SES	2	2
All other CS	3	3
TOTAL PERMANENT	5	5

CHIEF COUNSEL

	FY83	FY84
cs-15	1	1
All other GS	1	1
TOTAL PERMANENT	2	2

EXECUTIVE STAFF

	FY83	FY84
All other CS	3	3
TOTAL PERMANENT	3	3

RESOURCES & FINANCIAL MANAGEMENT OFFICE

	FY83	FY84
cs-14	1	1
All other GS	16	16
TOTAL PERMANENT	17	17

PROCUREMENT & CONTRACTS OFFICE

	FY83	FY84
CS-14	1	1
All other CS	11	11
TOTAL PERMANENT	12	12

FACILITIES ENGINEERING OFFICE

	FY83	FY84
CS-14	1	1
All other GS	9	9
TOTAL PERMANENT	10	10

INSTALLATIONS OPERATIONS OFFICE

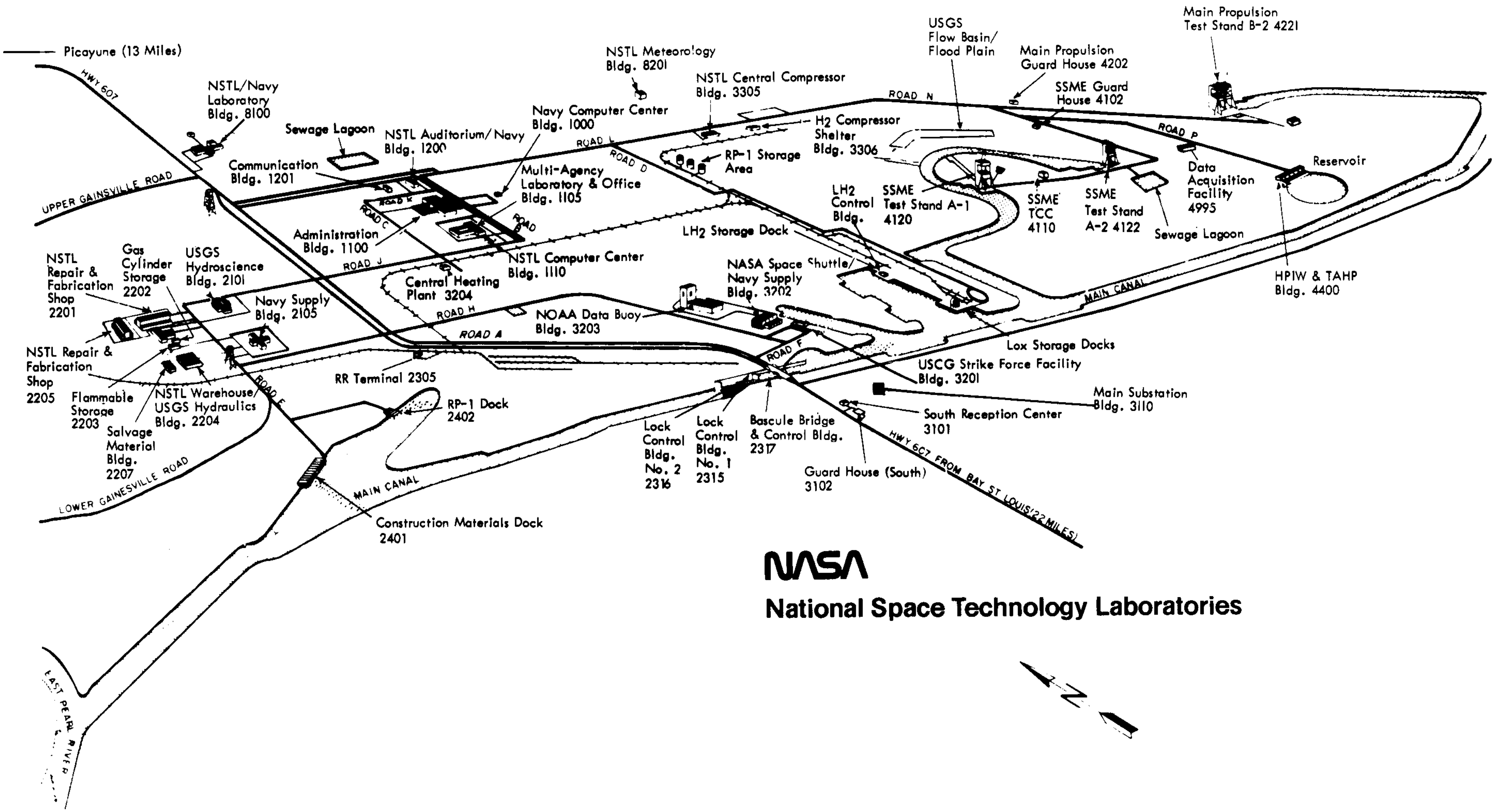
	FY83	FY84
GS-14	4	4
All other CS	12	12
TOTAL PERMANENT	16	16

EARTH RESOURCES LABORATORY

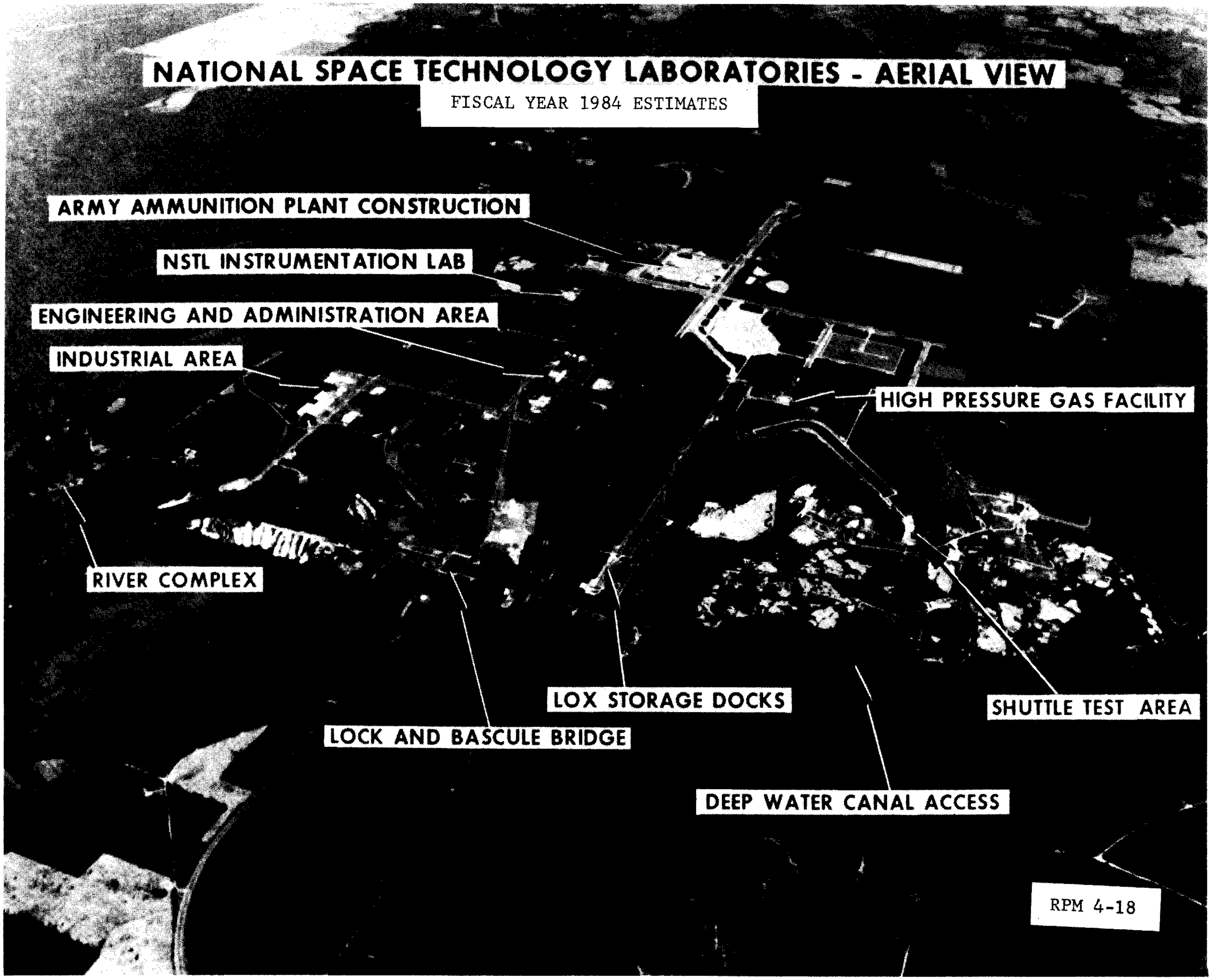
	FY83	FY84
SES	1	1
CS-15	3	3
cs-14	5	5
All other CS	30	30
TOTAL PERMANENT	39	39

NSTL LOCATION PLAN

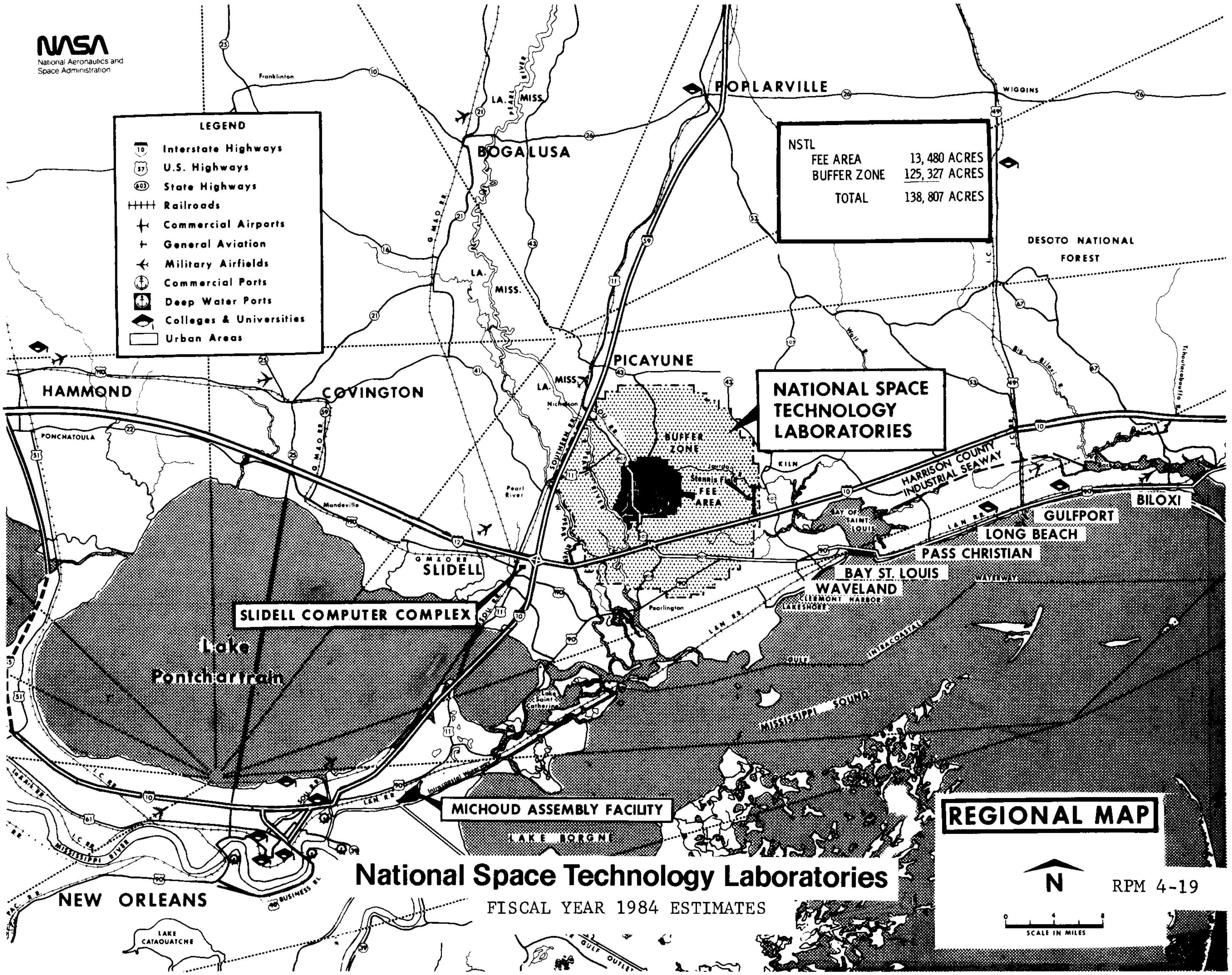
FISCAL YEAR 1984 ESTIMATES



National Space Technology Laboratories



NATIONAL SPACE TECHNOLOGY LABORATORIES - AERIAL VIEW
FISCAL YEAR 1984 ESTIMATES
ARMY AMMUNITION PLANT CONSTRUCTION
NSTL INSTRUMENTATION LAB
ENGINEERING AND ADMINISTRATION AREA
INDUSTRIAL AREA
HIGH PRESSURE GAS FACILITY
RIVER COMPLEX
LOX STORAGE DOCKS
SHUTTLE TEST AREA
LOCK AND BASCULE BRIDGE
DEEP WATER CANAL ACCESS
RPM 4-18


NASA
National Aeronautics and Space Administration
LEGEND
Interstate Highways
U.S. Highways
State Highways
Railroads
Commercial Airports
General Aviation
Military Airfields
Commercial Ports
Deep Water Ports
Colleges & Universities
Urban Areas
NSTL
FEE AREA 13,480 ACRES
BUFFER ZONE 125,327 ACRES
TOTAL 138,807 ACRES
POPLARVILLE
BOGALUSA
WIGGINS
DESOTO NATIONAL FOREST
PICAYUNE
HAMMOND
COVINGTON
NATIONAL SPACE TECHNOLOGY LABORATORIES
BUFFER ZONE
FEE AREA
HARRISON COUNTY INDUSTRIAL SEAWAY
KILN
BILOXI
GULFPORT
LONG BEACH
PASS CHRISTIAN
BAY ST. LOUIS
WAVELAND
SLIDELL
SLIDELL COMPUTER COMPLEX
Lake Pontchartrain
MISSISSIPPI SOUND
MICHOUD ASSEMBLY FACILITY
LAKE BORGNE
NEW ORLEANS
REGIONAL MAP
N
SCALE IN MILES
National Space Technology Laboratories
FISCAL YEAR 1984 ESTIMATES
RPM 4-19

GODDARD SPACE
FLIGHT CENTER

RESEARCH AND PROGRAM MANAGEMENT

FISCAL YEAR 1984 ESTIMATES

GODDARD SPACE FLIGHT CENTER

DESCRIPTION

The Goddard Space Flight Center (GSFC), located 15 miles northeast of Washington, D.C., at Greenbelt, Maryland, is situated on a 552 acre main site. Three additional nearby plots of 554 acres comprise the remote site area and contain the Goddard Antenna Test Range, the Goddard Optical Facility, the Propulsion Research Facility, the Laser Facility, the Magnetic Fields Component Test Facility, the Attitude Control Test Facility, and the Network Training and Test Facility. The Center also utilizes an additional 6,165 acres at the Wallops facility located on the Atlantic Coast of Virginia's eastern shore. The Wallops facility consists of 1,833 acres on the main base, 3,085 acres on Wallops Island launching site, 107 acres on the mainland tracking site, and 1,140 acres of marshlands. The total capital investment for the Goddard Space Flight Center, including tracking stations, contractor-held facilities at various locations, and the Wallops facility, as of September 30, 1982, was approximately $849,166,000.

The majority of the Goddard Space Flight Center's personnel are located at Greenbelt, Maryland; other personnel are located at the Wallops facility in Virginia, the Goddard Institute for Space Studies in New York City, and throughout the world, managing the operation of satellite tracking and communications network stations.

CENTER ROLES AND MISSIONS

The Goddard Space Flight Center, established in 1959 as the first major United States installation specifically devoted to the investigation and exploration of space, conducts a wide-ranging program in space science and applications. The GSFC has developed many diverse capabilities: the management of complex projects; the development of wholly integrated spacecraft, ranging from systems engineering to development, integration, and testing; the development and operation of satellite tracking networks, and data acquisition and analysis; scientific research including both theoretical studies and the development of many significant scientific experiments flown on satellites; and the operation of a research airport, located at Wallops, in support of NASA's aeronautics research programs. The principal and supporting roles are:

PRINCIPAL

Earth Orbital Spacecraft Development and Flight Operations - includes spacecraft propulsion and supporting technology such as low cost structural evaluation and reliability demonstration, advanced guidance systems and space power systems. Major emphasis is on automated, standard spacecraft systems, free-flyers, experiment development and integration, and the planning and conducting of associated flight operations.

Tracking and Data Acquisition Systems and Support Operations - plans, develops and implements the tracking network and systems and facilities for data processing and anlysis, communications, and mission control: planning and conducting support of Earth orbital spacecraft, aeronautical research and sounding rockets, which includes flight control, tracking, data acquisition, communications, and information processing and analysis: and network planning and implementation support for Space Shuttle. Tracking and data acquisition responsibilities also include deep space and orbital phase acquisition of all mission types and the implementation of the Tracking and Data Relay Satellite System.

Launch Range and Research Airport Management and Operations - plans and operates the Wallops launch range, associated aircraft, and a research airport in support of NASA aerospace programs as well as those of the Department of Defense, other government agencies, and the academic and international community. Launch support is provided for the expendable Scout launch vehicles which are launched from the Wallops facility.

Expendable Launch Vehicles - Goddard is the management center for the Delta launch vehicle, the only U.S. medium class standard launch vehicle used for NASA missions and reimbursable missions for other government agencies, domestic commercial users, and international users.

Space Science and Applications - develops the science and technology discipline bases, developing and calibrating spaceborne sensors, ground data processing and analysis systems, conducting scientific research and theoretical modeling studies, and implementing science and applications experiments in astronomy, solar physics, high energy, astrophysics, solar terrestrial studies, environmental observations and resources observations.

Sounding Rocket Development, Procurement and Operations - develops and procures sounding rockets and carrying out all phases of operations from mission/flight planning to landing and recovery, including supporting systems (i.e., guidance, telemetry and attitude control, power, payload housing, separation systems, and recovery).

Balloon Program - manage, monitor, schedule, and provide technical oversight of balloon activities conducted for NASA and other agencies providing multidiscipline payload development support.

Spacelab Payload Development - develop, analytically integrate and process data for Spacelab payloads in astrophysics, solar terrestrial physics, astronomy, and applications.

Special Payload Activities - involves the management of such payload activities as sounding rocket class payloads which will be flown on the Space Shuttle, Get-Away-Specials, etc., and of balloon and aircraft projects. This involves development and operations of diverse mechanical, electrical, aerodynamic, propulsion, control, thermal, and combined systems.

SUPPORTING

Planetary Science - develop and apply techniques for the analysis of planetary atmospheres.

Aerospace Flight Test Support - plan and conduct launches of scientific payloads and aeronautical tests and other research; and development and related activities as requested by elements of NASA, the Department of Defense, other government agencies, and the worldwide scientific community.

SUMMARY OF RESOURCES REQUIREMENTS

Funding Plan By Function

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of Dollars)		
I. Personnel and Related Costs..................	137,446	135,950	144,635	144,464
II. Travel.......................................	3,070	3,684	3,600	3,885
III. Operation of Installation.....................	28,616	34,004	32,630	35,377
A. Facilities Services.......................	(15,878)	(18,498)	(18,276)	(20,285)
B. Technical Services........................	(3,988)	(4,161)	(4,905)	(4,531)
C. Management and Operations..................	(8,750)	(11,345)	(9,449)	(10,561)
Total, fund requirements..................	169,132	173,638	180,865	183,726

Distribution of Permanent Positions by Program

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
Direct Positions				
Space Transportation System	189	158	152	135
Space transportaion system development	31	32	26	25
Space transportation operations	158	126	126	110
Space Science and Applications	1,870	1.884	1.882	1.898
Physics and astronomy	933	1,008	971	1.015
Life sciences	---	---	2	3
Planetary exploration	88	63	79	79
Space applications	849	813	830	801
Technology Utilization	9	7	6	5
Aeronautics and Space Technology	149	139	128	122
Aeronautical research and technology	24	19	21	21
Space research and technology	125	120	107	101
Tracking and Data Acquisition	698	709	699	708
Subtotal. direct positions	2.915	2.897	2.867	2.868
Center Management and Operations Support	746	726	756	755
Total. permanent positions	3.661	3.623	3.623	3,623

PROGRAM DESCRIPTION

	Permanent Positions (Civil Service)
SPACE TRANSPORTATION CAPABILITY DEVELOPMENT..	25

Space Shuttle activities at GSFC include planning and implementing the equipment systems, communications data, voice circuits, and operational procedures required for support of the Space Shuttle program.

SPACE TRANSPORTATION OPERATIONS...	110

A GSFC activity in this area is to manage and coordinate the Agency's Get-Away-Special program. Center personnel coordinate with an international array of experimenters (including private citizens, high schools, universities and industry) who have procured, through Agency established procedures, payload space on the Space Shuttle. Tasks include ensuring that experiments meet flight and safety specifications and securing the experiments into containers for each Space Shuttle flight. Individual experimenters are responsible for the performance of their instruments/experiments.

Activities also include the management of a Flight Support System which is an electromechanical interface between the orbiter and Multimission Modular Spacecraft and other spacecraft with compatible interface parameters. It will be used for ascent, retrieval, repair, and descent phases of Space Shuttle flights carrying Multimission Modular Spacecraft and other compatible spacecraft.

In addition, GSFC will be involved in the Payload Assist Module which is designed to insert Space Shuttle-borne payloads into orbits not attainable by the orbiter, and can also be used with expendable launch vehicles.

The GSFC is the management center for the Delta launch vehicle. The Delta vehicle is NASA's only medium class standard launch vehicle and has the capability of accurately puting a wide variety of spacecraft into a broad spectrum of orbits, ranging from equatorial to polar inclinations. The Delta is used for NASA missions, and for a wide range of reimbursable missions for other Government agencies, domestic commercial users, and international users. The Delta project provides for production of the launch vehicles required for approved missions, provides the necessary operations support, production capability for projected missions and solid propellant upper stages and apogee booster motors. The Delta project provides engineering, quality, and configuration control services to maintain operational capability with high reliability. In addition, a Scout launch capability is maintained by the Wallops facility.

	Permanent Positions (Civil Service)
PHYSICS AND ASTRONOMY..	1,015

Physics and Astronomy is comprised of research in two major areas: Astrophysics and Solar Terrestrial Research.

Astrophysics activities have the objective of: accomplishing laboratory and flight scientific research to increase human knowledge of the Earth's space environment, the stars, the Sun, and other objects in space; and providing advanced technical development of experiments and spacecraft components for future astrophysics missions. Organized activities accomplish scientific progress in all of the following discipline areas of astrophysics: gamma ray astronomy, X-ray astronomy, ultraviolet and optical astronomy, infrared and radio astronomy, particle astrophysics, solar physics, interplanetary physics, planetary magnetospheres, and astrochemistry.

During 1984, GSFC will be actively involved in development, assembly and test of instruments for the Space Telescope, Gamma Ray Observatory, Cosmic Background Explorer, Space Shuttle Payloads and Integrated Rocket Experiments, and in the analysis of data from several major Physics and Astronomy missions including the High Energy Astronomy Observatories, the Dynamics Explorer, the Solar Maximum Mission, the Interplanetary Monitoring Probes, and the International Sun-Earth Explorers.

The International Ultraviolet Explorer spacecraft, with its unique satellite control and data management systems, will continue to afford guest observers the opportunity to point the satellite in real-time from the ground, quickly make observations, and receive data in visual format. Additionally, the International Sun-Earth Explorers are providing unusual opportunities to study the dynamic interactions of the solar wind and the Earth's magnetosphere from various points in space. The ISEE-3 spacecraft, in particular, will continue its unique trajectory through the Earth's magnetic tail and embark on the course that will cause it to intercept the comet Giocobini-Zinner in September 1985.

In 1984, efforts will involve the integration, testing and launch of the Active Magnetospheric Particle Tracer Explorer.

During 1984, GSFC will be involved in the development of a U.S.-supplied focal plane High Resolution Imaging instrument to be flown on the German-supplied Roentgen Satellite plus coordination of the spacecraft/STS integration leading to a launch in 1987 on the U.S.-provided Space Shuttle. The Roentgen Satellite, will perform the first all sky survey of X-ray sources and will point to and study specific X-ray sources for extended periods of time.

In addition, GSFC will be involved in preparation for the Solar Maximum Repair Mission planned for 1984. The purpose of this mission is to restore the Solar Maximum Mission observatory to full operational capability and to demonstrate the Space Shuttle's capability to rendezvous with and repair in-orbit spacecraft.

The development of the Solar Optical Telescope (SOT) will begin during 1984. This facility will carry an instrument package to study solar physics in detail which has never before been possible. The launch is planned for 1989 and will be the first of various 7 to 14 day Space Shuttle/Spacelab missions planned for the next decade. The SOT will sense radiation from the deep ultraviolet to the near infrared and enable astronomers to study solar phenomena from the photosphere to the solar corona.

GSFC will provide the management and support of NASA domestic and international Sounding Rocket programs. The project involvement extends from the conception through launch and data analysis in support of research within Galactic Astronomy, High Energy Astrophysics, Solar Physics, Plasma Physics, Upper Atmospheric and Interdisciplinary Research, and the space applications of materials processing science. During 1984, we plan to continue using sounding rocket technology for sounding rocket class payloads which will be flown on the Space Shuttle.

GSFC will continue to manage the scientific balloon program providing for launch and tracking support, flight hardware support, and technical support including new systems development. Goddard has assumed responsibility for the National Scientific Balloon facility at Palestine, Texas, which was previously sponsored by the National Science Foundation, providing management and technical oversight.

	Permanent Positions (Civil Service)
LIFE SCI~CES..	3

At GSFC, Life Sciences is utilizing data from remote sensing satellites as part of its efforts to further understand global biological characteristics and processes.

PLANETARY EXPLORATION..	79

The GSFC science activity within the Planetary Exploration program is designed to emphasize the physics of interplanetary space and planetary environments. To this end, GSFC will maintain a strong and viable research group.

During 1984, GSFC investigators will continue to be actively involved in the development of two instruments, the Neutral Mass Spectrometer and the Photopolarimeter Radiometer for the Galileo Project. These instruments will measure chemical composition and the physical properties of clouds in the atmosphere of Jupiter. GSFC will also be involved in the data analysis activity of various instruments on Voyager and Pioneer Venus.

SPACE APPLICATIONS...	801

The Space Applications program for 1984 will include activities in the discipline areas of Resource Observations and Environmental Observations. GSFC is engaged in three major types of activities in these areas: research and technology, flight projects, and application data analysis.

The research and technology effort in general is directed toward solving major problems in the above mentioned disciplines. It stresses continuity of research and development from the assessment of these problems to conceptual instrument design and testing, mission payload studies, concepts of flight missions, and their final analyses and evaluation after launch. It includes the design and construction of mathematical models to study:

1. The global circulation of this planet's atmosphere for better weather and climate predictions;

2. The geopotential fields (gravity and magnetic) of the Earth to provide an improved understanding of the structure and evolution of the earth;

3. The processes of the Oceans such as surface winds, waves, temperature, currents, and circulation to support our weather and climate effort as well as our ocean research program;

4. The physical characteristics of the Earth's renewable and nonrenewable resources which can be remotely sensed; and

5. The interaction between the Earth's atmosphere, hydrosphere, and cryosphere.

Other examples of efforts of more specific nature include new instrument development for measuring temperature and pressure profiles in the atmosphere which are essential input parameters for our weather and climate models; user active and passive microwave systems for measuring sea surface temperatures and winds, as well as soil moisture essential for water resources modeling and agriculture yield predictions; new instruments for ocean color measurements important for ocean studies, and pollution determination; new high precision laser electronic ranging systems to support our Earth and ocean dynamics efforts; new low cost data collection platforms; and low cost global positioning system terminals for civilian application.

Applications flight project responsibilities for 1983 and 1984 include:

1. Operational weather satellite missions for the National Oceanic and Atmospheric Administration (NOAA), including launch of NOAA-E, (first U.S. satellite equipped with search and rescue instrumentation) and GOES-F.

2. Continued operations of Landsat and Nimbus satellites to provide remotely sensed resources and environmental observations to a worldwide applications research community.

3. Landsat-D was successfully launched on July 16, 1982, and the ground segment became fully operational in October 1982 for Multi-Spectral Scanner data acquisition. The data from the Thematic Mapper on the newly launched Landsat-D will be analyzed to evaluate the benefits of a new generation of land observation instruments. The Landsat-D Prime launch readiness is scheduled for 1983.

4. Earth Radiation Budget Experiment — During 1984, the Earth Radiation Budget Satellite (ERBS) project instrument delivery will be completed, and the ERBS observatory integration and test leading to a launch in August 1984 will be completed.

5. Conducting correlation measurements from balloons, sounding rockets, aircraft, and ground installations.

Space Applications activities also involve the formulation, analysis, and distribution of applications data received from satellites for which GSFC has management responsibility. Such demonstrations concern the use of data from Nimbus-7 spacecraft for the solution of problems concerning pollution, ocean resources and dynamics, and weather and climate. Similar activities will take place using the data from Landsat-D spacecraft. This information will be of use to investigators in the agricultural, forestry, geology, land use, cartography, hydrology, ecology, and oceanography disciplines.

	Permanent Positions (Civil Service)
TECHNOLOGY UTILIZATION	5

Technology Utilization activities are directed toward the application of space technology to public and private sector needs. Foremost among the technology applications projects in 1984 is the programmable, implantable medication system. Other activities include:

1. New technology identification, evaluation, and publication,

2. Dissemination methods and techniques, and

3. Public sector technology applications projects.

AERONAUTICAL RESEARCH AND TECHNOLOGY...	21

In 1984, the Wallops airport will be used to conduct research tests of various aircraft in the terminal area operating environment. Flight studies will be made of new approach and landing procedures utilizing the latest in guidance equipment and techniques, pilot information displays, terminal area navigation, and tests of other systems leading to automatic landing of aircraft.

One runway has been modified to study the effect of runway grooving as a means of controlling aircraft hydroplaning on wet or slush-covered runways. Studies of automotive hydroplaning have also been conducted using this runway. The data acquired from the aircraft and automotive tests will ultimately assist in the development of safer, more flexible transportation systems. Wallops will also continue to support general aviation stall/spin research, single-pilot Instrument Flight Rules flight tests, agricultural aerial applications research, aircraft noise research, and safety research for general aviation.

	Permanent Positions (Civil Service)
SPACE RESEARCH AND TECHNOLOGY..	101

The Space Research and Technology Program activities provide results appropriate to space mission capability. Past efforts have produced many worthwhile advances in space system capability, reliability, and effectiveness. During 1984, areas of continuing attention include advanced sensors and instruments; advanced technology encompassing thermal energy management, data processing and information extraction, cryogenic cooling for sensors, and fundamental electronics; power system management; and large space structures technology.

Activities in such areas as machine intelligence, robotics, computer system sciences, earth orbiting spacecraft systems, communications, detectors, command and control will continue.

Research and technology will be directed primarily to applications and future astronomical, astrophysical, atmospheric, and space station activities.

TRACKING AND DATA ACQUISITION....	708

The Space Tracking and Data Systems program at GSFC involves five main areas: Operation of the Space Tracking and Data Network; mission control, data processing, and computation support for flight projects; the Laser Networks; the implementation of the Tracking and Data Relay Satellite System; and aeronautics and sounding rocket support.

The Space Tracking and Data Network is operated in direct support of NASA's Earth orbiting scientific and applications satellites and Shuttle/Spacelab programs. In addition, the Network provides services to satellites that are operated by other United States Government Agencies, such as the Department of Defense and the National Oceanic and Atmospheric Administration, by foreign governments, and by commercial companies. Appropriate segments of the Network deliver critical coverage for the launch of spacecraft that are on deep space missions by providing support during portions of the early flight path not visible to NASA's Deep Space Network (DSN).

NASA Communications Network provides all operational communications required by NASA. Facilities of this Network link the stations of the Space Tracking and Data Network, and will make it possible for the Tracking and Data Relay Satellite System to operate as a part of the overall tracking and data acquisition complex for which NASA has responsibility.

In support of the aeronautics and sounding rockets program, GSFC provides tracking, data acquisition, communication and control. This includes support of balloons, sounding rockets, reentry vehicles, satellites launched from Wallops Island and other offsite range locations, and other aeronautical and research programs conducted at Wallops.

The Tracking and Data Relay Satellite System (TDRSS) will become operational during 1983 with two satellites in geosynchronous orbit and the White Sands Ground Terminal providing telemetry, tracking and command support. During 1984, the Tracking and Data Relay Satellite System will continue to provide the satellite relay of Earth orbiting spacecraft data to a single ground station located at White Sands, New Mexico. The system will employ both S- and Ku-band frequencies and will greatly increase coverage capabilities available to Earth orbiting spacecraft. The network will provide the operational interface between the project users and the Tracking and Data Relay Satellite System. With the demonstration of a successful Tracking and Data Satellite System, a number of Space Tracking and Data Network (STDN) ground stations will be closed. However, some of the current stations will be maintained to provide for Shuttle launch and planetary support. The remaining stations will be consolidated with the DSN in 1984/1985 to provide high-Earth orbit support not available from TDRSS.

During 1984, the STDN is projecting support for planned missions including Space Transportation System Flights STS-9 through STS-19, for the launching of the ERBS and repair of the Solar Maximum Mission spacecraft as well as the first Spacelab mission.

STDN support is planned to continue for a number of active in-orbit scientific satellites such as the International Sun Earth Explorers, International Ultraviolet Explorer, Landsat, Solar Maximum Mission, and Nimbus programs.

Launch support by the Space Tracking and Data Network that is planned to be accomplished during the year includes four Delta Vehicle launches, and four Atlas Centaur launches. Support of European and Japanese program launch activities are also planned.

Support is provided to flight missions in the categories of mission control, operational computing, and sensor data processing. This includes mission and systems analysis, systems design and implementation, and the operation and maintenance of multimission and dedicated technical facilities to support both Goddard and non-Goddard missions.

During 1984, emphasis will continue to be placed on defining concepts for spacecraft and data autonomy in order to modify designs of flight and ground systems to improve the response, capacity, and effectiveness of the end-to-end data system, as well as the development of system concepts and techniques to provide data to multiple users from multiple data sources.

In the area of mission control, work will continue on the Multisatellite Operations Control Center to allow the automation of systems in order to minimize manpower requirements of mission support.

For operational computing, major efforts will be continued to provide a new computing capability for command management so that effective and efficient utilization of spacecraft systems through commands operating out of on-board command memories may be effected.

Emphasis will be placed on end-to-end data concepts and, in addition, a major effort will be continued to process and distribute Spacelab payload data, as well as to provide command and control capabilities for the Space Telescope project.

	Permanent Positions (Civil Service)
CENTER MANAGEMENT AND OPERATIONS SUPPORT..	755

Center Management and Operations Support is support or services being provided to all Goddard Space Flight Center organizations which cannot be identified exclusively to a single program or project. The civil service personnel involved are:

Director and Staff - The Center Director, Deputy Director and immediate staff, staff organizations, e.g., Comptroller, Chief Counsel, Equal Opportunity, and Planning and Analysis.

Management Support - The GSFC civil service workforce who provide information and control services supporting all levels of Center management, both program and functional. Specific functions include resources and financial management, program control, contracting and procurement, property management, personnel management, and management systems and analysis.

Operations Support - The GSFC civil service workforce who provide for the operation and maintenance of institutional facilities, buildings, systems and equipment, including those who manage or provide technical services such as automatic data processing, reliability and quality assurance, medical care, and photographic support.

RESOURCE REQUIREMENTS BY FUNCTION

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of Dollars)		
I. **PERSONNEL AND RELATED COSTS**....................	137,446	135,950	144,635	144,464

Summary of Fund Requirements

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
A. Compensation and Benefits				
1. Compensation				
a. Permanent positions....	121,757	120,734	126,823	126,548
b. Other than full-time permanent positions	1,579	1,684	1,716	1,693
c. Overtime and other compensation..... ..	1,277	958	1,335	1,360
Subtotal, Compensation	124,613	123,376	129,874	129,601
2. Benefits................................	11,576	11,321	13,566	13,565
Subtotal, Compensation and Benefits.. .	136,189	134,697	143,440	143,166
B. Supporting Costs				
1. Transfer of personnel.....	99	164	100	110
2. Personnel training..............	1,158	1,089	1,095	1,188
Subtotal, Supporting Costs...........	1,257	1,253	1,195	1,298
Total, Personnel and Related Costs........	137,446	135,950	144,635	144,464

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of Dollars)		
A. Compensation and Benefits....................	136,189	134,697	143,440	143,166
1. Compensation.	124,613	123,376	129,874	129,601
a. Permanent positions....	121,757	120,734	126,823	126,548

The current estimate for 1983 reflects an increase from the 1983 budget estimate due to the recent pay increases.

Basis of Cost for Permanent Positions

In 1984, the cost of permanent positions will be $126,548,000. The decrease from 1983 is calculated as follows:

Cost of permanent positions in 1983..		126,823
Cost increases in 1984...		+3,409
Within grade and career advances:		
Full year effect of 1983 actions.........................	+1,343	
Partial year effect of 1984 actions......................	+1,869	
Full year effect of 1983 pay increases....................	+197	
Cost decreases in 1984...		−3,684
Turnover savings and abolished positions:		
Full year effect of 1983 actions...........................	−935	
Partial year effect of 1984 actions.......................	−1,838	
One less paid day in 1984....................................	−487	
Alteration in the method of calculation of salaries paid (PL 97-253)...	−424	
Cost of permanent positions in 1984..		126,548

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of Dollars)		
b. Other than full-time permanent				
1. Cost...............................	1,579	1,684	1,716	1,693
2. Workyears...........................	133	159	141	135

The distribution of 1984 workyears is as follows:

Distribution of Other than Full-Time Permanent Workyears

Program	Workyears
Developmental programs..	72
Summer employment program..	10
Youth opportunity programs..	23
Other temporary...	30
Total..	135

The increase from the 1983 budget estimate to the 1983 current estimate is a result of the recent pay increase and a realignment of the skill mix emphasizing developmental programs. The 1984 estimate reflects a reduction in workyears.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
c. Overtime and other compensation.....	1,277	958	1335	1,360

Overtime at GSFC is required to meet peak operational requirements where additional workhours are essential, generally culminating in the launch of a manned or automated spacecraft. Some of the areas involved are fabrication, experimentation, testing, launching and tracking of the spacecraft. The increase from the 1983 budget to the 1983 current estimate reflects the recent pay increase and 1982 experience. The 1984 budget estimate is based on the Center's current estimate of requirements.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of Dollars)		
2. Benefits	11,576	11,321	13,566	13,565

The following are the amounts of contribution by category:

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
Civil Service Retirement Fund	8,301	8,216	8,625	8,394
Employee life insurance	328	316	350	335
Employee health insurance	2,672	2,264	3,137	3,115
Workmen's Compensation	211	374	300	300
FICA	42	151	42	41
Medicare	---	---	1,083	1,347
Other benefits	22	---	29	33
Total	11,576	11,321	13,566	13,565

The increase from the 1983 budget estimate to the 1983 current estimate is primarily due to the recent pay increases and increased health benefits, including NASA's share of Medicare costs. The workmen's compensation for 1983 and 1984 reflects estimates based on Department of Labor billings.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
B. Supporting Costs	1,257	1,253	1,195	1,298
1. Transfer of personnel	99	164	100	110

This category includes the reimbursement to employees for movement of household goods to the employee's new duty station, transfer between tracking stations, and other relocation expenses. The decrease from the 1983 budget estimate to the 1983 current estimate reflects a revised number of transfers.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
2. Personnel training	1,158	1,089	1,095	1,188

The personnel training costs are based on current training programs and the need to reorient skills of employees into areas compatible with the direction of the current space program and GSFC's role in the program. The increase from the 1983 budget estimate to the 1983 current estimate reflects an increase in tuition costs. The 1984 estimate provides for an increased level of training at anticipated tuition cost levels.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of Dollars)		
II. TRAVEL..	**3,070**	**3,684**	**3,600**	**3,885**

Summary of Fund Requirements

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
A. Program Travel................................	2,718	3,338	3,298	3,581
B. Scientific and Technical Development Travel.. ...	160	108	90	90
C. Management and Operations Travel...............	192	238	212	214
Total, Travel................................	3,070	3,684	3,600	3,885

Explanation of Fund Requirements

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
A. Program Travel................................	2,718	3,338	3,298	3,581

Program travel is essential to the accomplishment of the Center's mission, particularly with regard to the Space Science and Applications, Aeronautics and Space Technology, Tracking and Data Acquisition, and Space Transportation System programs. In these areas, efforts will be devoted to performing applications research, developing complex satellites and launch systems, managing data processing systems, and creating scientific instruments for further research. The decrease from the 1983 budget estimate to the 1983 current estimate reflects a partial application of the reductions required because of the appropriation reduction and pay raise absorption. The increase in the 1984 estimate over the 1983 current estimate is due to increased requirements associated with such programs as Gamma Ray Observatory, Active Magnetospheric Particle Tracer Explorer, Upper Atmospheric Research Satellites, Earth Radiation Budget Experiment, Search and Rescue, and Solar Maximum Retrieval/Repair Mission and anticipated travel cost increases.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of Dollars)		
B. Scientific and Technical Development Travel....	160	108	90	90

Scientific and technical development travel permits employees to participate in meetings and technical seminars with other representatives of the aerospace community. This participation allows them to benefit from exposure to technological advances outside GSFC, as well as to present both accomplishments and problems to their associates. Many of the meetings are working panels convened to solve certain problems for the benefit of the Government. The 1984 estimate reflects the planned level of travel.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
C. Management and Operations Travel...............	192	238	212	214

Management and operations travel is used for the direction and coordination of general management matters. It includes travel in such areas as personnel, financial management, and procurement activities, travel of the Center top management to other NASA Centers and local travel in and around the Washington metropolitan area and to and from Wallops. The 1984 estimate reflects approximately the same level of activity as in 1983 at anticipated price levels.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of Dollars)		
III. OPERATION OF INSTALLATION......................	28,616	34,004	32,630	35,377

Summary of Fund Requirements

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
A. Facilities Services............................	15,878	18,498	18,276	20,285
B. Technical Services.............................	3,988	4,161	4,905	4,531
C. Management and Operations	8,750	11,345	9,449	10,561
Total, Operation of Installation..............	28,616	34,004	32,630	35,377

Explanation of Fund Requirements

Operation of Installation provides a broad range of services, supplies, and equipment in support of the Center's institutional activities. These are divided into three major functional areas: Facilities Services, the cost of renting real property, maintaining and repairing institutional facilities, and equipment, and the cost of custodial services and utilities; Technical Services, the cost of automatic data processing for management activities, and the cost of educational and informational programs and technical shops supporting institutional activities; and Management and Operations, the cost of administrative communications, printing, transportation, medical, supply, and related services.

The decrease from the 1983 budget estimate to the 1983 current estimate is primarily due to the delay and deferral of activities to accommodate the appropriation reduction and partial absorption of increased pay costs. The 1984 budget estimate provides for projected increases in support contractor rates, supplies, materials, and equipment along with anticipated utility rates.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of Dollars)		
A. FACILITIES SERVICES............................	15,878	18,498	18,276	20,285

The Greenbelt facility is located on a 552 acre main site, and on a 554 acre remote site area with a complex of laboratory and office-type buildings as well as test facilities. This complex encompasses 2,517,500 gross square feet of building space including 34 buildings. This physical plant supports an average daily on-Center population of about 6,000. Many of the test facilities are used on schedules involving more than one shift and during off-peak hours.

The Wallops facility includes 6,165 acres and a complex of facilities which mainly consists of research, airport, and launch operations facilities. This complex encompasses 1,057,344 gross square feet of building space including three major buildings. Also included are three major technical facilities. This physical plant supports an average daily on-site population of approximately 1,000.

Summary of Fund Requirements

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
1. Rental of Real Property....................	1,091	481	723	895
2. Maintenance and Related Services...........	2,718	3,060	3,371	3,823
a. Facilities........................... ...	2,718	3,060	3,371	3,823
b. Equipment	---	---	---	---
3. Custodial Services.........................	3,192	3,706	3,543	3,976
4. Utility Services...........................	8,877	11,251	10,639	11,591
Total, Facilities Services................	15,878	18,498	18,276	20,285

Explanation of Fund Requirements

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
	(Thousands of Dollars)			
1. Rental of Real Property	1,091	481	723	895

Provides space for personnel at three tracking stations and the Goddard Institute for Space Studies (GISS) in New York, as well as storage and warehouse space for equipment, supplies and materials. The decrease from the 1982 actuals to the 1983 current estimate is due to movement of the utilities portion of the rental of property at the Goddard Institute for Space Studies to the utilities services function. The increase from the 1983 budget estimate to the 1983 current budget estimate more accurately reflects 1982 experience. The increase in the 1984 budget estimate provides for an anticipated increase in rental payments to the General Services Administration.

2. Maintenance and Related Services...........	2,718	3,060	3,371	3,823

This activity includes general buildings maintenance such as painting, inspection and mechanical and electrical maintenance. Provides for ground maintenance and also includes supplies and facilities equipment such as building materials, electrical and electronics materials, general maintenance and operating materials. The increase from the 1983 budget estimate to the 1983 current estimate reflects necessary maintenance, painting and equipment upgrading. The increase in 1984 provides for cost increases in contractual services and purchased goods.

3. Custodial Services.........................	3,192	3,706	3,543	3,976

The estimate provides for support service contractor effort for janitorial, plant security, firefighting and ambulance services. These services include washing and relamping of light fixtures, office cleaning, minor laundry services, trash removal, badging of all on-site personnel and visitors, vehicle identification, and firefighting and ambulance service at Wallops. The decrease from the 1983 budget estimate to the 1983 current estimate reflects a reduction in support contractor effort to reflect 1982 experience more accurately. The increase in the 1984 budget estimate is due to anticipated rate changes in support service contracts.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of Dollars)		
4. Utility Services...........................	8,877	11,251	10,639	11,591

The estimate provides for operation and maintenance of the utility plant and distribution systems as well as the purchase of utility services, and supplies, materials and equipment required for the maintenance of these systems. At the Greenbelt facility, electricity is purchased from the Potomac Electric and Power Company, natural gas from Washington Gas Light Company and fuel oil from a local supplier. Water and sewage service is provided by the Washington Suburban Sanitary Commission. The only purchased utilities at Wallops are electricity and fuel oil to operate the heating plant. This funding also provides for the operation and maintenance of the heating plant and water and sewage facilities. The decrease from the 1983 budget estimate to the 1983 current estimate is based on current rate estimates. The increase in 1984 provides for anticipated utility and support service contractor rate increases.

B. TECHNICAL SERVICES.............................	3,988	4,161	4,905	4,531

Summary of Fund Requirements

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
1. Automated Data Processing.......	2,445	2,387	3,222	2,628
a. Equipment	492	531	769	543
b. Operations...	1,953	1,856	2,453	2,085
2. Scientific and Technical Information.......	1,182	1,159	1,182	1,403
a. Library	775	801	758	940
b. Education and Information...............	407	358	424	463
3. Shop and Support Services..................	361	615	501	500
Total, Technical Services.................	3,988	4,161	4,905	4,531

Explanation of Fund Requirements

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
	(Thousands of Dollars)			
1. Automatic Data Processing	2,445	2,387	3,222	2,628

This funding provides accounting and management information to satisfy requirements of NASA and GSFC management. The lease and purchase costs of all administrative ADP hardware are included in this estimate. Leased equipment includes a Zerox 1200 printer, various terminals, and other peripheral equipment. The systems supported include institutional management, finance and accounting, procurement and personnel management. The increase in the 1983 current estimate is due to the purchase of a computer for the Wallops facility and increased contractor support for programming services. The 1984 estimate provides for recurring costs of administrative computer operations less the one time acquisition in 1983.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
2. Scientific and Technical Information.......	1,182	1,159	1,182	1,403

These funds provide for the operation of a technical library at GSFC, a public affairs education and informational program, and support to the Center in the provision of various scientific and technical information services. Catalog, reference, translating services, and distribution of books and publications in the operation of the GSFC library are also funded in this estimate. This includes over 65,000 books, 45,000 journals, plus almost one million microfiche copies of aerospace documents. This estimate also provides for exhibit management and refurbishment, demonstration models, workshops and symposia, and educational and information materials. The increase from the 1983 budget estimate to the 1983 current estimate is due to an increase in support contractor effort for the Wallops library. The 1984 effort reflects full funding of essentially the same level of services as in 1983.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
3. Shop and Support Services................	361	615	501	500

Support is provided in the areas of safety, photo services, graphics, and publications. Fire protection system maintenance and related supplies and equipment; film and print processing, photographic supplies and repair of photographic equipment, art work services and related supply and equipment costs; and materials and equipment maintenance for compilation of documents comprise this category. Also included is engineering and fabrication support for facility planning and alteration; and safety, reliability, and quality assurance requirements and other technical services. The decrease from the 1983 budget estimate to the 1983 current estimate is a reduction in the level of photo and graphic services. The 1984 estimate provides for approximately the same level of activity as the 1983 current estimate.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of Dollars)		
C. MANAGEMENT AND OPERATIONS........................	8,750	11,345	9,449	10,561

Summary of Fund Requirements

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
1. Administrative Communications................	3,138	4,547	3,608	4,081
2. Printing and Reproduction....................	223	348	253	299
3. Transportation......	2,386	2,462	2,099	2,366
4. Installation Common Services................	3,003	3,988	3,489	3,815
Total, Management and Operations...	8,750	11,345	9,449	10,561

Explanation of Fund Requirements

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
1. Administrative Communications..............	3,138	4,547	3,608	4,081

The estimate provides for local telephone service, long distance telephone service, and other nontelephone communications. Local telephone services cover 3,900 PBX internal lines and 6,000 telephone instruments. There are ten tielines for Baltimore-area communications. Four hundred Centrex lines are used for computer data operations. Other communication services include teletype costs, including the GSA Automatic Records System, United Press International Wire Service for the public affairs office and telephone operators. The 1983 budget estimate reflects 1982 experience. The 1984 estimate provides for approximately the same level of service with anticipated rates.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of Dollars)		
2. Printing and Reproduction	223	348	253	299

This estimate provides the funding for an on-site printing plant operated by GSFC personnel. This printing plant produces approximately 17,000,000 units of printing each year. In addition to this on-site printing plant, GSFC must also purchase from private firms under Government Printing Office contract about 30,000,000 units of printing each year. This purchased printing is a combination of an overflow requirement that cannot be handled because of the on-site workload and items that cannot be handled with the on-site equipment. Types of printing accomplished by off-site private firms are multiple-copy forms, multicolor work, and forms for computer use. Also included in this function is the support service contractor effort to operate the printing and reproduction facility at Wallops. The decrease from the 1983 budget estimate to the 1983 current estimate is a reduction in the level of printing activity and reflects 1982 experience. The 1984 estimate reflects planned increases in off-site contractor printing requirements and negotiated support contractor wage increases.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
3. Transportation..	2,386	2,462	2,099	2,366

This estimate provides the following services: operation of a transportation center; packing and crating; rigging equipment for shipment; storage and warehousing; and moving and hauling. Maintenance and repair of the Wallops administrative aircraft, supplies and equipment for vehicle maintenance, and special vehicle rental are also included. The decrease from the 1983 budget to the 1983 current estimate is due to a deferral in the purchase of motor vehicles. The increase in the 1984 budget estimate reflects anticipated increases in costs and the purchase of motor vehicles deferred from 1983.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of Dollars)		
4. Installation Common Services...............	3,003	3,988	3,489	3,815

This activity supports Center management and staff activities, provides medical services, and covers various installation support services. Funding includes patent searches and applications; stenographic services, handbook revisions, equal opportunity programs; and general administrative supplies, materials, equipment maintenance, (microfilm, copiers, special typewriters) for staff offices; operation of the GSFC on-site health unit and medical services for the Goddard Institute for Space Studies employees in New York. Provides for emergency care on-site, annual physical exams for Goddard employees, fitness programs, immunizations and counseling. Annual physical exams are provided for approximately 3,600 employees at the Center. The necessary supplies, materials, and equipment for operation of the health unit are included. The decrease from the 1983 budget estimate to the 1983 current estimate is due to deferral in purchases of supplies and materials. The 1984 estimate represents the purchase of supplies and equipment and anticipated contractor rate increases.

NATONAL AERONAUTICS AND SPACE ADMINISTRATON
GODDARD SPACE FLIGHT CENTER
Greenbett, Maryland

DIRECTOR / DEPUTY DIRECTOR

	83	84
SES	2	2
EXCEPTED	0	0
GS 16	0	0
GS 15	2	2
GS 14	0	0
OTHER GS	7	7
WAGEGRADE	0	0
TOTAL	11	11

TOTAL

	83	84
SES	53	53
EXCEPTED	3	3
GS 16	1	1
GS 15	310	310
GS 14	555	555
OTHER GS	2558	2563
WAGE GRADE	143	138
TOTAL	3623	3623

NASA OFFICE OF INSPECTOR GENERAL GSFC FIELD OFFICE

COMPTROLLER

	83	84
SES	2	2
EXCEPTED	0	0
GS 16	0	0
GS 15	3	3
GS 14	7	7
OTHERGS	93	93
WAGEGRAOE	0	0
TOTAL	105	105

DIRECTOR OF FLIGHT ASSURANCE

	83	84
SES	1	1
EXCEPTED	0	0
GS 16	0	0
GS 15	17	17
GS 14	27	27
OTHERGS	70	70
WAGEGRAOE	0	0
TOTAL	115	115

CHIEF COUNSEL

	83	84
SES	1	1
EXCEPTED	0	0
GS 16	0	0
GS 15	2	2
GS 14	3	3
OTHER GS	4	4
WAGEGRADE	0	0
TOTAL	10	10

EOUAL OPPORTUNITY PROGRAMS OFFICE

	83	84
SES	0	0
EXCEPTED	0	0
GS 16	0	0
GS 15	0	0
GS 14	1	1
OTHERGS	5	5
WAGEGRAOE	0	0
TOTAL	6	6

PROGRAM AND INSTITUTIONAL PLANNING OFFICE

	83	84
SES	2	2
EXCEPTED	0	0
GS 16	0	0
GS 15	3	3
GS 14	2	2
OTHERGS	2	2
WAGEGRAOE	0	0
TOTAL	9	9

DIRECTOR OF MANAGEMENT OPERATIONS

	83	84
SES	3	3
EXCEPTED	1	1
GS 16	0	0
GS 15	15	15
GS 14	31	37
OTHERGS	501	506
WAGE GRADE	141	136
TOTAL	698	698

DIRECTOR OF FLIGHT PROJECTS

	83	84
SES	12	12
EXCEPTED	0	0
GS 16	0	0
GS 15		
GS 14	66	66
OTHERGS	[illegible]	[illegible]
WAGE GRADE	0	50
TOTAL	326	326
		6

DIRECTOR OF MISSIONS AND DATA OPERATIONS

	83	84
SES	3	3
EXCEPTED	0	0
GS 16	0	0
	15	15
GS 15 GS 14	37	37
OTHERGS	162	162
WAGE GRADE	0	
TOTAL	217	210

DIRECTOR OF SCIENCES

	83	84
SES	6	6
EXCEPTED	0	0
GS 16	1	1
GS 15	41	41
GS 14	50	50
OTHER GS	204	204
WAGE GRADE		
TOTAL	300	300
		302

DIRECTOR OF ENGINEERING

	83	84
SES	4	4
EXCEPTEO	0	0
GS 16	0	0
GS 15		
GS 14	118	118
OTHER GS	539	539
WAGE GRADE	0	
TOTAL	108	706
		8

DIRECTOR OF NETWORKS

	83	84
SES	3	3
EXCEPTEO	0	0
GS 16	0	0
GS 15	36	36
GS 14	69	69
OTHER GS	296	296
WAGEGRADE	0	0
TOTAL	404	404

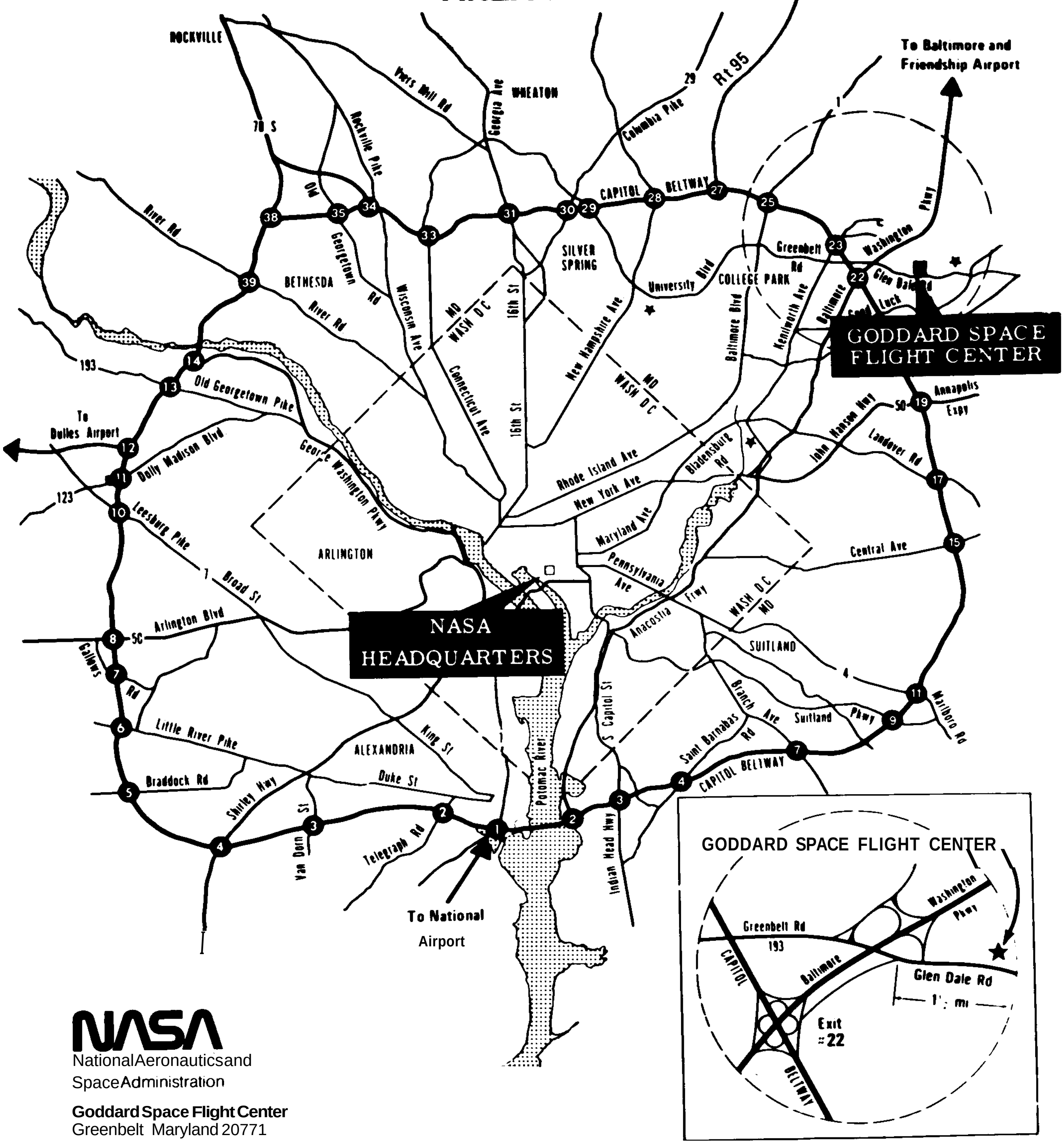
DIRECTOR OF APPLICATIONS

	83	84
SES	10	10
EXCEPTED	2	2
GS 16	0	0
GS 15	51	51
GS 14	79	79
OTHER GS	329	329
WAGE GRADE	0	0
TOTAL	471	471

DIRECTOR OF SUBORBITAL PROJECTS AND OPERATIONS

	83	84
SES	4	4
EXCEPTED	0	0
GS 16	0	0
GS 15	10	10
GS 14	21	21
OTHER GS	198	198
WAGE GRADE	2	2
TOTAL	241	241

GODDARD SPACE FLIGHT CENTER
FISCAL YEAR 1984 ESTIMATES
AREA MAP

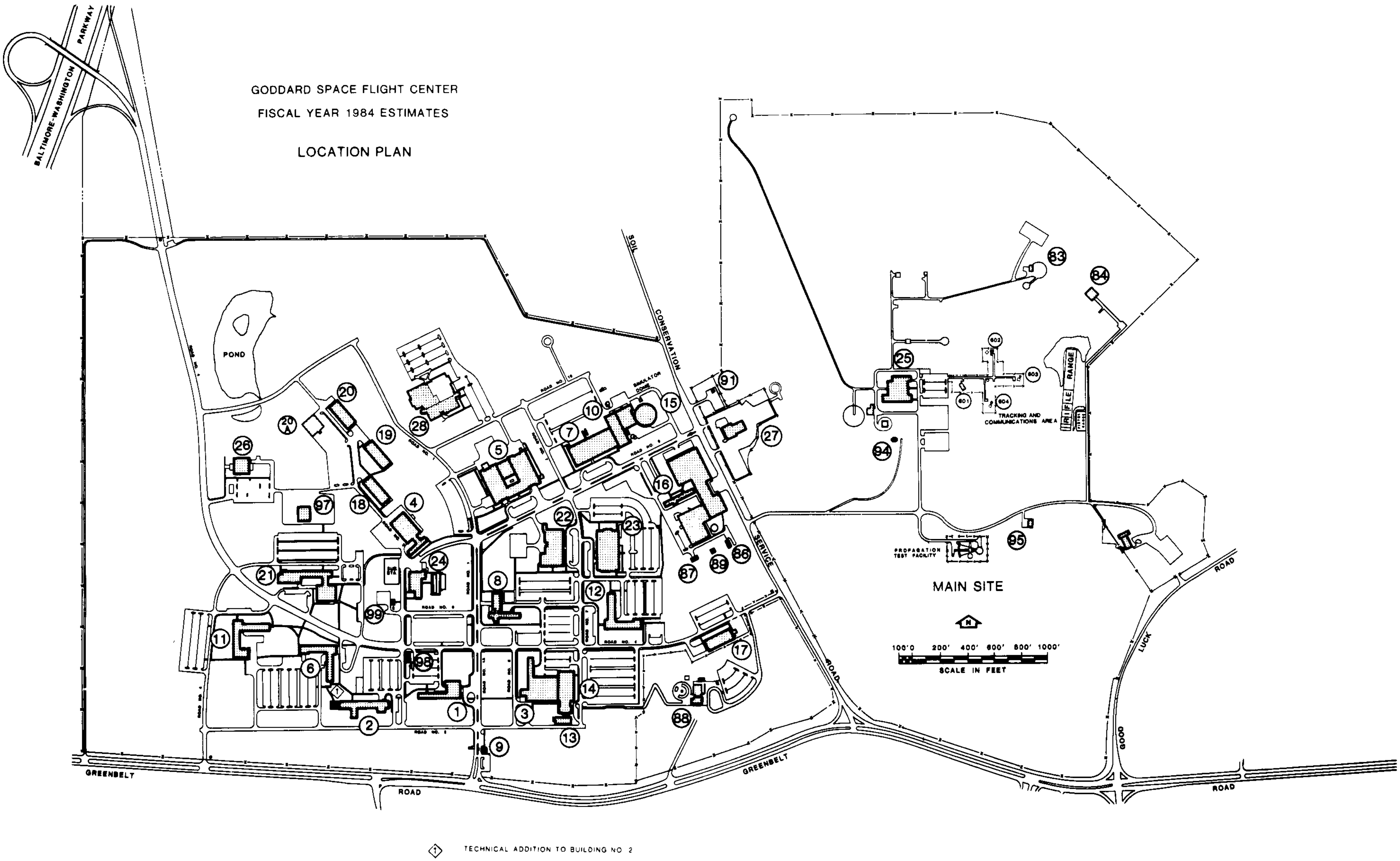


NASA
National Aeronautics and
Space Administration

Goddard Space Flight Center
Greenbelt Maryland 20771

GODDARD SPACE FLIGHT CENTER
FISCAL YEAR 1984 ESTIMATES

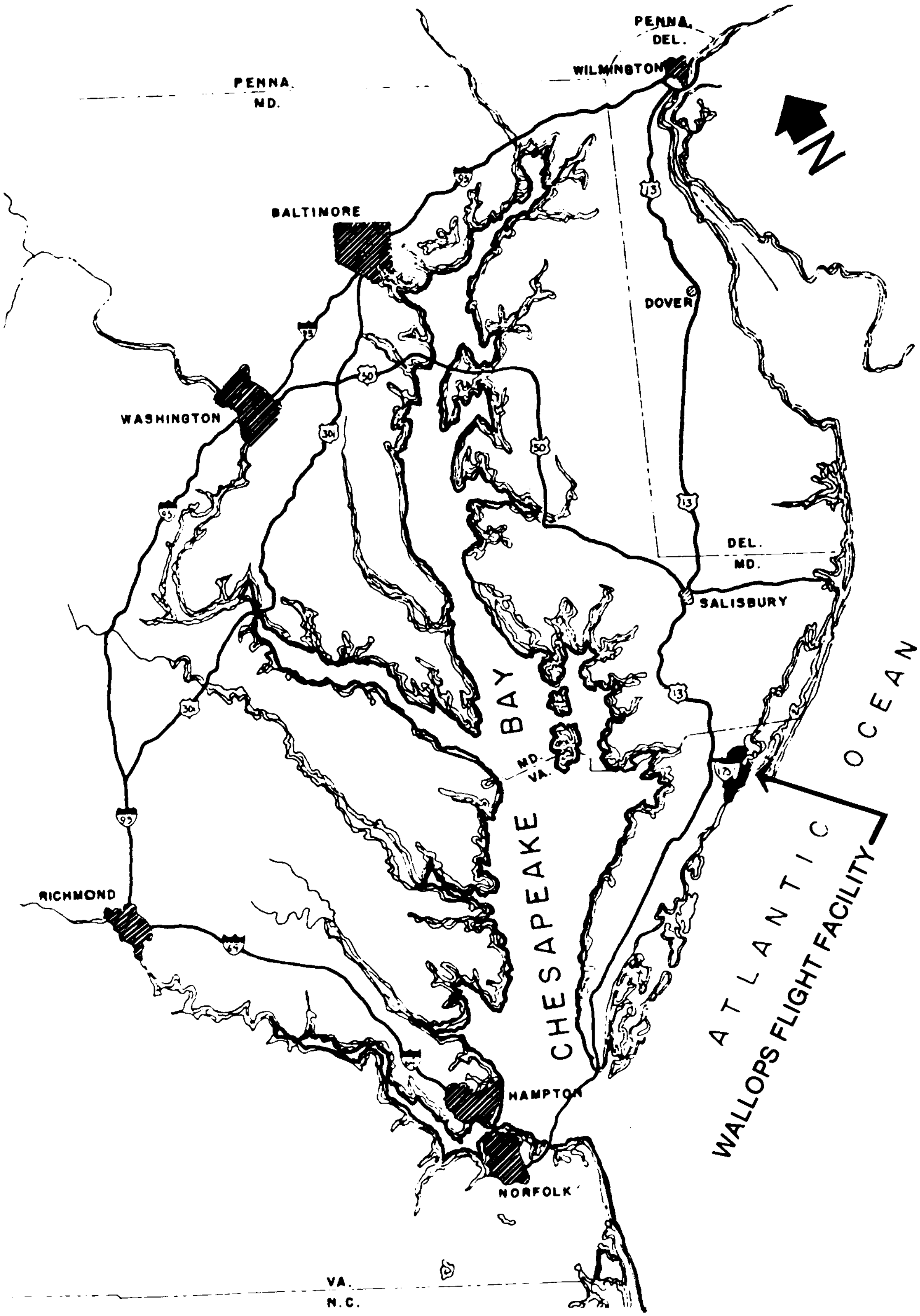
LOCATION PLAN



GODDARD SPACE FLIGHT CENTER
FISCAL YEAR 1984 ESTIMATES
AERIAL VIEW

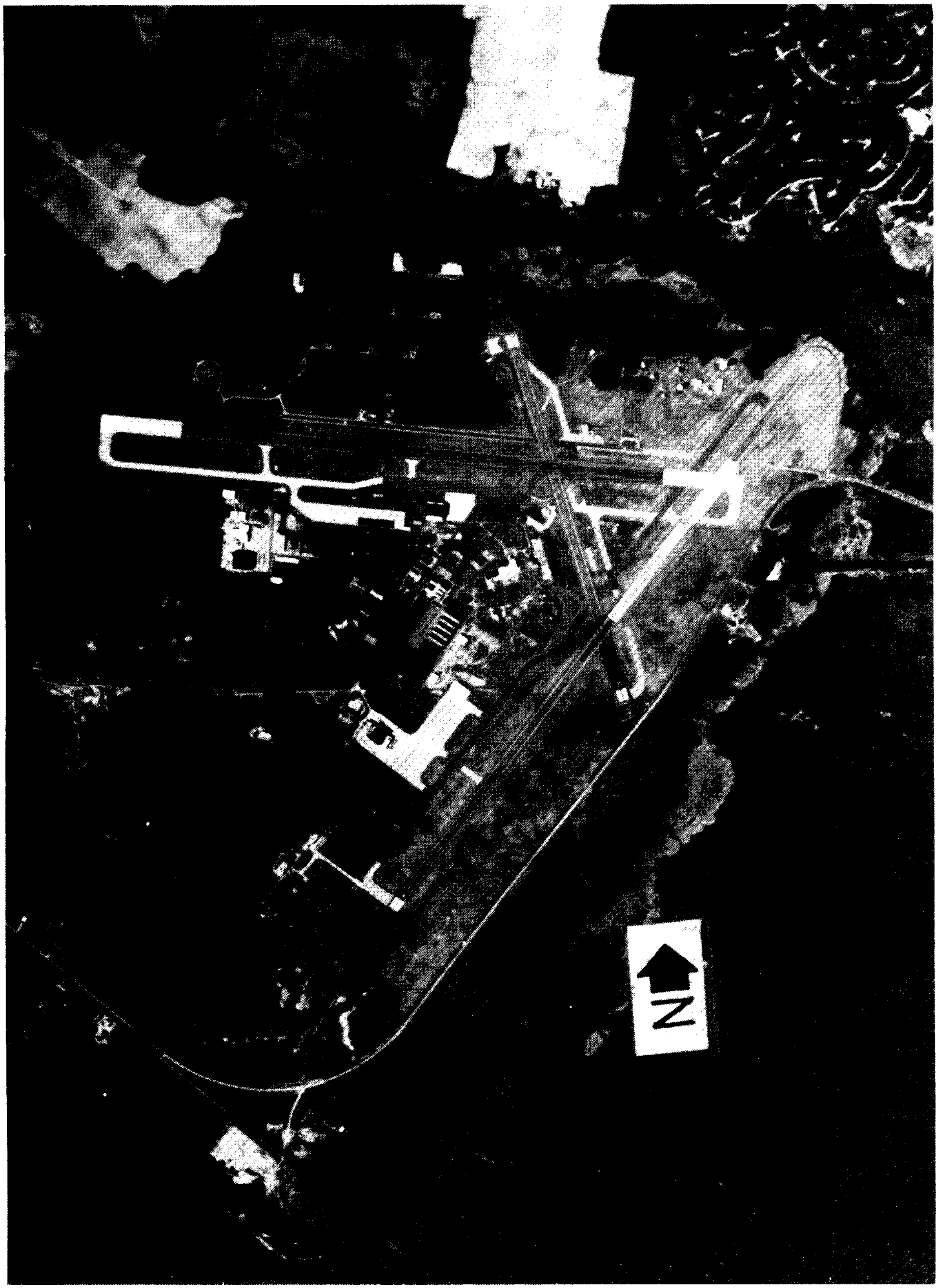
GODDARD SPACE FLIGHT CENTER/WALLOPS

FISCAL YEAR 1984 ESTIMATES
AREA MAP



GODDARD SPACE FLIGHT CENTER/WALLOPS
FISCAL YEAR 1984 ESTIMATES

AERIAL VIEW



AMES
RESEARCH CENTER

RESEARCH AND PROGRAM MANAGEMENT

FISCAL YEAR 1984 ESTIMATES

AMES RESEARCH CENTER

DESCRIPTION

Established in 1940, Ames Research Center (ARC) operates in two locations. The Ames Research Center proper is located on 423.5 acres at the southern end of San Francisco Bay on land contiguous to the U.S. Naval Air Station, Moffett Field, California. Certain facilities, such as the utilities and airfield runways, are used jointly by NASA and the Department of the Navy. Also housed at this location is the U.S. Army Research and Technology Laboratory. Personnel from this Laboratory work closely with ARC personnel on research of mutual interest. The capital investment of ARC, Moffett Field, including fixed assets in progress and contractor-held facilities at various locations, as of September 30, 1982, was $653,680,000.

The ARC Hugh L. Dryden Flight Research Facility (DFFU?) is 65 air miles northeast of Los Angeles. DFRF is located at the north end of Edwards Air Force Base on 521 acres of land under a permit from the Air Force. The Air Force encompasses 300,722 acres. DFRF is adjacent to Rogers Dry Lake, a 55 square-mile area with a complex of runways varying in length from five to eleven miles. The total capital investment of the Dryden Flight Research Facility, including fixed assets in progress and contractor-held facilities at various locations, as of September 30, 1982, was $97,457,000.

CENTER ROLES AND MISSIONS

The programs at ARC involve research and development in the fields of aeronautics, space science and applications, and space technology, as well as utilization for national needs of the new science and technology growing from the aerospace program. Specifically, the Center's major program responsibilities are concentrated in: theoretical and experimental aerodynamics, rotorcraft technology, high performance aircraft technology, flight simulation, flight testing, computational fluid dynamics, fluid and thermal physics, space sciences, airborne sciences and applications, human factors, exobiology and space biology, and ground and flight projects in support of aeronautics and space technology. In addition to these major program responsibilities, the Center provides major support for military programs. The principal and supporting roles are:

PRINCIPAL

Aeronautics and Space:

Fundamental Aerodynamics - advance the general state of the art, both theoretical and experimental.

Rotorcraft Technology - develop a technology base for improving efficiency, safety, performance and environmental acceptability.

Low-Speed Vehicle Systems - conduct research in the vertical takeoff and landing area with emphasis on rotorcraft technology and systems.

Computational Fluid Dynamics - further the state of the art through the definition of new systems, both hardware and software, and application to aeronautical and other related areas.

Aeronautical Flight Research - conduct flight research using aircraft as test facilities and conduct flight research programs of advanced aerospace vehicle concepts.

Flight Test Techniques - investigate and develop new flight test techniques to improve the capability of conducting flight research.

Flight Instrumentation Development - direct the development of new methods and equipment for flight measurements.

Guidance and Control - conduct theoretical investigations, simulation and flight test evaluation of new and innovative concepts in rotorcraft flight control to validate design methods and verify system performance in the flight environment.

Human-Vehicle Interactions - further the state of the art through the study of man-machine and other human factor interactions and considerations involved in aircraft operations.

High Speed Aircraft - conduct flight research on advanced military configurations and demonstrating the potential for improved aircraft performance through the integration of aircraft systems.

Materials and Structures - conduct tests to increase the understanding of structural responses to aerodynamic heating, with particular emphasis on high temperature space or hypersonic vehicle structures.

Flight Simulation - improve the state of the art to permit more effective use of simulators in aircraft design and validation-of-flight simulation; providing support to NASA and other government agencies' development and flight programs.

Military and FAA Aeronautics - provide facilities and technical support to military and civil aviation in areas consistent with other ARC aeronautics roles and unique capabilities.

Airborne Research and Applications - conduct airborne research and applications experiments by operating instrumented jet aircraft,

Fluid and Thermal Physics - develop thermal analysis methods and thermal protection systems required for re-entry and orbital transfer vehicles, including probe development for the Galileo mission.

Planetary Mission Operations and Data Analysis - complete mission operations and data analysis support for the currently approved Pioneer series of missions.

Physics and Astronomy - conduct research in infrared astronomy, atmospheric physics, and astrophysics to contribute to basic understanding of the planet Earth.

Life Sciences:

Biomedical Support Systems - develop advanced technology for long-duration life support systems and protective systems.

Biological Experiments - develop, manage and operate experiments for determining effects of space flight on living organisms (nonhuman) and for providing information applicable to solving space medicine problems.

Life in the Universe - provide understanding of the origin, evolution, nature and distribution of complex life in the universe and understanding its interaction with the terrestrial environment.

SUPPORTING

Space Transportation System Passenger Selection Criteria - develop and evaluate the medical criteria for noncrew passenger selection.

Astronomical Observation Techniques - focus on airborne research and the development of infrared techniques and supporting systems for use in Spacelab payloads.

Vertical/Short Takeoff and Landing (V/STOL) Technology - develop a technology base for military V/STOL in support of Department of Defense missions.

space Shuttle Orbiter - provide contingency recovery capability for operational flights.

SUMMARY OF RESOURCES REQUIREMENTS

Funding Plan by Function

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of Dollars)		
I. Personnel and Related Costs	77,916	78,391	81,759	81,957
11. Travel	1,929	2,109	2,158	2,212
III. Operation of Installation	21,209	24,393	23,457	24,666
A. Facilities Services	(10,811)	(14,411)	(12,618)	(13,640)
B. Technical Services	(3,384)	(2,610)	(3,339)	(3,136)
C. Management and Operations	(7,014)	(7,372)	(7,500)	(7,890)
Total, fund requirements	101,054	104,893	107,374	108,835

Distribution of Permanent Positions by Program

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
Direct Positions				
Space Transportation System	47	32	32	32
Space transportation capability development	47	---	---	---
Space transportation operations	---	32	32	32
Space Science and Applications	360	358	350	353
Physics and astronomy	114	79	114	117
Life sciences	126	122	127	125
Planetary exploration	65	74	58	57
Space applications	55	83	51	54
Technology Utilization	4	3	3	3
Aeronautics and Space Technology	1.111	1,137	1,147	1,144
Aeronautical research and technology	972	991	1,001	1.001
Space research and technology	139	146	146	143
Tracking and Data Acquisition	28	29	28	28
Tracking and data systems	28	29	28	28
Subtotal. direct positions	1,550	1,559	1,560	1,560
Center Management and Operations Support	487	462	461	461
Total. permanent positions	2,037	2.021	2.021	2.021

PROGRAM DESCRIPTION

	Permanent Positions (Civil Service)
SPACE TRANSPORTATION OPERATIONS..	32

The DFRF was the primary recovery site for the first five Space Shuttle missions, and is the primary recovery site for flights **6, 8, 9,** and **11.** After landing, the Space Shuttle Orbiter is returned to Kennedy Space Center by shuttle carrier aircraft. DFRF will provide Orbiter convoy operations support and maintain the Space Shuttle/carrier aircraft and the Space Shuttle servicing facilities at Dryden.

PHYSICS AND ASTRONOMY..	117

In **1984,** the civil service personnel will provide support for the airborne astronomy program, which includes a **C-141** aircraft, the Kuiper Airborne Observatory and a Lear Jet aircraft, which are operated by ARC as flying astronomical observatories with the bulk of the observing accomplished by various university research teams. These facilities are supported through in-house science competence and with in-house capability to operate research aircraft. The Center controls a variety of operational aircraft, including two U-2C's, an **ER-2,** a **CV-990** and a C-130, some of which serve as unique national and international facilities for research in astronomy, geophysics, meteorology, and Earth resources: others acquire data for remote sensing projects and provide a mechanism for integration of spaceborne, airborne, and ground-based data acquisition and processing systems.

Infrared astronomy observation from space platforms avoids obscuration caused by the Earth's atmosphere. ARC has the responsibility for instruments to accomplish these observations, including development of the telescope portion of the Infrared Astronomical Satellite, which will be launched in early **1983:** definition of an advanced instrument for use on Spacelab missions: the Space Shuttle Infrared Telescope Facility; definition studies; and studies of instruments that may eventually be used as free flyers in space.

LIFE SCIENCES...	125

In **1984,** the civil service personnel will continue to be involved in research, hardware development, and program management related to meeting program milestones in the areas of understanding the effects of space flight on humans and other life forms, managing nonhuman biological experiments in space, developing advanced life support concepts and systems, and understanding the origin, evolution, and distribution of life and life-related chemicals on Earth and elsewhere in the universe.

Biomedical research will be conducted to investigate the deleterious effects of space flight on humans. Specifically, causes and potential countermeasures for the observed changes in the musculoskeletal and cardiovascular systems, as well as overall crew performance, during space flight will be studied. Ground-based space flight simulations and actual flight experiments with humans and animals will be performed to provide a basis for understanding why and how biological systems are affected by space flight.

The first units of the Research Animal Holding Facility, configured to hold squirrel monkeys and rats, together with their supporting systems, will be delivered to the Kennedy Space Center from ARC for integration into the Spacelab and Space Shuttle for flight on Spacelab 3. Crew training will commence for the first flight of a space motion sickness Autogenic Feedback Experiment. Preliminary studies of life sciences requirements for a potential future space station are now underway. Long duration in space and more extensive experimental capabilities than those provided by Spacelab are expected to provide an excellent life sciences opportunity. Assembly will be initiated on experiments selected for flight on Spacelab 4, the first dedicated life sciences mission.

studies will be continued using closed chambers for investigations of controlled ecology life support systems for space flight.

Research into the origin and distribution of life and life-related molecules will also be continued through analyses of biochemical pathways in living systems and analyses of chemical abundances in Precambrian deposits by the use of an ultrasensitive stable isotope measuring system and studies of the interactions of known polypeptides and DNA segments.

	Permanent Positions (Civil Service)
PLANETARY EXPLORATION..	57

A continuing series of project management activities, backed by the scientific expertise of principal investigators from ARC, other NASA Centers and the university community, are required in 1984 to accomplish the ongoing programs in support of Agency goals in planetary exploration. An in-house supporting research and technology program serves both to maintain the Center's scientific and technological expertise and to provide the stimulus and definition for new planetary research.

In 1984, the civil service personnel will continue to provide project management and scientific support for the following: Pioneers 6 through 9, a series of spacecraft exploring the physics of the interplanetary medium and providing ongoing data on the plasma in which the Earth is immersed; Pioneers 10 and 11, two spacecraft that made close approaches to the planet Jupiter to study both the planet itself and the interaction of the solar wind with the planet's strong magnetic field. (These spacecraft were then retargeted by being swung in the Jovian gravity field to explore other regions of the solar system. Pioneer 11 made the first close reconnaissance of Saturn in 1979, and Pioneer 10 has now crossed the orbit of Uranus on its way out of the solar system); Pioneer Venus, launched in 1978, with its orbiter now in place around Venus; and the Galileo project, a natural outgrowth of the Pioneer Venus atmospheric probes, and development of the Galileo Probe.

ARC researchers are playing a key role in these missions. ARC scientists are responsible, as principal investigators, for measuring the characteristics of the solar wind in the interplanetary space and near Jupiter and Saturn; measuring the atmospheric structure on Mars, Venus and Jupiter; measuring atmospheric radiation balance and cloud characteristics on Venus and Jupiter; and studying Mars for possible life-bearing soils and compounds. ARC researchers are also responsible for synthesizing atmospheric models of these planets that can be used to explain their current state and evolution and be applied in comparative studies to understand features of the Earth's weather and climate.

ARC maintains an active program of laboratory and theoretical studies to develop basic atmospheric modeling concepts, obtain the necessary physical data on a molecular scale to interpret the spacecraft observations, and develop improved scientific measurements and instrument concepts for use on spacecraft.

This program concentrates on planetary atmospheres and has been particularly active in combining radiative transfer concepts with aerosol physics to obtain comprehensive planetary cloud and dust models.

	Permanent Positions (Civil Service)
SPACE APPLICATIONS..	54

A highly diversified group of scientifically capable people is required to support programs in Earth and environmental observations including space, atmospheric, and stratospheric programs; to provide skilled personnel and specialized airborne platforms in support of the Agency's applications satellite programs; to interpret and process both spaceborne and airborne remotely sensed data; and to interact with and disseminate data and associated processing techniques to the user community.

The ARC stratospheric research program is an integrated activity that blends the expertise of the Center personnel and university scientists, both in the development of computer models for the upper atmosphere and in the measurement of stratospheric constituents and properties from aircraft platforms. Computer modeling of the stratosphere is being performed at ARC to understand the unperturbed stratosphere and predict the effects on the stratosphere of various pollutants, such as aircraft emissions and fluorocarbons, and of natural events such as the solar cycle, solar storms and volcanic eruptions. A similar program which focuses on the climatic effects of aerosols in the Earth's atmosphere through models of aerosols and their radiative effects and through measurements of aerosol properties from ARC aircraft is also underway.

Further, the Center's space applications role is fulfilled by conducting an active and continuing broad program of applied research and development to enhance the use of remote and in-situ sensing technology for Earth resources applications and defining, developing, and evaluating potential satellite sensors, data acquisition and processing techniques, and associated communications technology.

	Permanent Positions (Civil Service)
TECHNOLOGY UTILIZATION	3

The technology utilization program at ARC is a community undertaking of scientists and engineers in many disciplines and Center organizations which work under the leadership and coordination of a full-time technology utilization staff. It serves to transfer knowledge developed from the NASA programs into industry for effective use in the marketplace.

AERONAUTICAL RESEARCH AND TECHNOLOGY	1,001

In 1984, the content of the ARC program in aeronautics is characterized in terms of three elements: generic research and technology, vehicle specific technology (e.g., rotorcraft) and aeronautical support to other Government agencies and to industry. These three elements form a coherent and interdependent program to meet the objectives of rotorcraft, powered-lift and high-performance aircraft improvements in aerodynamic propulsion and operational performance to improve terminal-area safety and efficiency and reduce aircraft noise and vibrations.

Generic Research and Technology:

The generic research and technology program at ARC is principally focused in the disciplines of fluid and thermal physics, propulsion, structures, flight dynamics, guidance and control, and human factors. The program provides the fundamental disciplinary advances, both theoretical and experimental, that extend the state of the art. Substantial progress is anticipated in ARC's ability to compute the theoretical behavior of aerodynamic flow and to measure experimental aircraft configuration parameters. Continued efforts will be directed toward providing advances in computational capability supporting aeronautical research. Numerical Aerodynamic Simulation will focus on augmenting the Nation's program in computational fluid dynamics and other areas of computational physics by developing an advanced capability that will provide modern and efficient access for users nationwide for application to computational aerodynamics, computational chemistry, and other complex analytical problems. Also, fundamental aerodynamic research will be continued using large- and small-scale research facilities and flight research vehicles to develop design methodologies for designing advanced aircraft. Flight research will continue for the development of aircraft systems integration technology including flight, propulsion, and aerodynamic controls. In controls and guidance, advanced control technology will focus on: developing reliable flight-critical control systems for advanced aircraft; evaluating and improving digital flight control system prediction tools, techniques, methodology and criteria; applying optimal control theory in conjunction with dynamic modeling of aircraft and ground-based guidance aids to provide new insights into the definition of air traffic control sytem interfaces; and conducting flight research on digital fly-by-wire concepts to continue to support the development of advanced flight systems technology. In 1984, the human factors program will include continuation of basic research in workload and performance measurements, fundamentals of visual perception, development of helicopter and high-performance aircraft display and control integration to reduce pilot workload, study of advanced flight display formats for improving information presentation to aircrews, and more complete understanding of human fatigue and circadian desynchronosis effects on aircraft pilots.

Vehicle Specific Technology:

The vehicle specific technology at ARC is focused on rotorcraft, powered-lift and high-performance aircraft. The vehicle technology emphasis at ARC relates to, and depends on, the basic capabilities and the aeronautical research disciplines described previously. The 1984 research program will include small-scale and large-scale wind tunnel testing and ground-based simulation, and flight research. Powered-lift aircraft performance is highly dependent on high-lift technology (both propulsive and aerodynamic lift) and advanced guidance and control systems, both of which are part of the ongoing program at ARC. High-performance aircraft research requirements include the areas of high angle-of-attack performance and control, sophisticated flight and aerodynamic controls, structural, aerodynamic, flight control and propulsive system interactions, and superaugmented aircraft. In rotorcraft aerodynamics, research will be conducted to improve the understanding of rotor aerodynamics, rotor/fuselage interaction and rotorcraft noise. In guidance, work will be pursued to improve all-weather rotorcraft capability for terminal area operations. In the controls area, flying qualities design criteria will be developed to improve control system concepts for better performance and mission capabilities for rotorcraft. In 1984, technology for next-generation rotorcraft will pursue further understanding relative to two high speed rotorcraft concepts--the tilt rotor and the Defense Advanced Research Projects Agency's (DARPA) X-wing.

Other Aeronautical Support:

ARC has traditionally received requests from other agencies and industry, as well as from other NASA Centers, for test support of their aircraft and systems development programs. Typically, ARC provides 8,000 to 9,000 hours per year of wind tunnel occupancy time in support of both commercial and military aircraft development, as well as support for large NASA projects such as the Space Shuttle. The Navy and NASA have agreed to a comprehensive technical support program for the Navy's Vertical/Short Takeoff and Landing (V/STOL) aircraft technology development. The U.S. Army Research and Technology Laboratory of the Army Aviation Research and Development Command is located at ARC. The Aeromechanics Laboratory, the primary investigator of Army rotorcraft flight dynamics and controls, is also located at ARC, working both on independent research and development projects and with a staff integrated into the NASA organization on projects of joint interest. Extensive use is made of ARC aeronautical research facilities in these efforts.

There are also a large number of joint programs with the Air Force Systems Command, the Naval Air Systems Command, and the Federal Aviation Administration (FAA). Examples of these joint efforts include: (1) V/STOL fighter studies, tilt rotor concept evaluation and an AV-8B flight test program with the Navy: (2) participation in the joint NASA/DARPA forward swept wing demonstration program: (3) continued participation in the joint NASA/USAF Advanced Fighter Technology Integration (AFTI) F-111 program for research and development of a mission adaptive wing that will obtain smooth in-flight contour changes to the wing aerodynamic shape to achieve improved aerodynamic efficiency; (4) continued participation in the joint NASA/USAF AFTI/F-16 program using a digital flight control system for conventional and nonconventional control without degrading overall performance; and (5) work on digital flight control system verification and validation with the FAA. To advance the state-of-technology on vehicle concepts, an increased effort in advanced tilt rotor technology will be launched with emphasis on exploring the means of improving speed, range, and flying qualities of the tilt rotor class of vehicle. Advanced structural, aerodynamic, propulsion, and control concepts will be investigated. In conjunction with the DARPA, a large scale flight investigation of the X-wing rotor system will be conducted, utilizing the Rotor Systems Research Aircraft. The focus will be in exploring the start-stop phase of flight for the high-speed X-wing concept.

	Permanent Positions (Civil Service)
SPACE RESEARCH AND TECHNOLOGY..	143

In 1984, these civil service personnel will provide a space research and technology program which encompasses both basic research and project support. The basic research focuses on entry technology and materials research. The project work supports Space Shuttle, the Orbiter Experiment3 (OEX) Program, the Infrared Astronomy Program, the Galileo Probe, and advanced work related to technology definition of a space station with a future potential to be permanently manned.

The entry technology research will provide aerothermodynamic data required for the design, development, and verification of planetary entry vehicles, and for computational fluid dynamic codes to predict space vehicle flow fields and performance. Work is proceeding to apply laser physics and laser techniques to the development of flow diagnostic tools that will be used to remotely probe gas dynamic flows that will in turn be used to define and verify turbulence models. Research efforts in the materials area will provide advanced thermal protection systems concepts and materials for heat shields to protect Earth and planetary entry vehicles (probes); develop computational chemistry codes to calculate basic properties of matter, and expand the understanding of surface-environment interactions (corrosion). Research also is being conducted in the advanced electronics and materials areas to determine atomic structure and properties of absorbed surface layers and to advance the state of the art of computing wave functions for molecules and atomic clusters.

In 1984, the Space Shuttle project will be supported with ground-based facilities to study a variety of aerodynamic and thermodynamic problems. The Galileo project will be supported with heat shield design and performance data, heat shield shape change effects on aerodynamics, and subsonic probe stability. In the area of orbiting astronomical instruments, work will continue to develop infrared detectors, define systems for precision pointing and control of telescopes, and advance the technology required to cool detectors to very low temperatures. ARC is supporting two Space Shuttle orbiter experiments. The first is an OEX experiment for Infrared Imaging of Shuttle that will be used to obtain measurements of surface temperatures of the lower and side surfaces of the orbiter by remote imagery from the C-141 Kuiper Airborne Observatory. The second is an OEX thermal protection experiment to study advanced materials and evaluate possible cost and weight reduction for the thermal protection system for Shuttle and advanced space transportation systems.

DFRF work will be directed primarily toward developing and conducting selected Space Shuttle experiments and performing disciplinary research in the high temperature space structures technology area.

The Shuttle experiments include: continuation of simulation studies to assist in analysis and solution of various problems that exist in certain flight profile areas between entry and landing, and evaluation of the performance of the Shuttle Entry Air Data System; studies to evaluate adequacy and provide a basis for improving Shuttle handling qualities criteria; and application of modified maximum likelihood parameter estimation methods for determination of digital flight control system, stability and control, performance, and structural and atmospheric turbulence characteristics in the Shuttle reentry environment.

High temperature space structures disciplinary research will involve analyses and laboratory tests of medium-sized specimens to evaluate predictive techniques for thermal structures. Also, airloads data will be obtained from calibrated strain gauges on the orbiter and compared with wind tunnel and theoretical predictions to evaluate flight measurement techniques and analytical methods.

	Permanent Positions (Civil Service)
TRACKING AND DATA ACQUISITION..	28

In 1984, DFRF will maintain and operate the NASA Aeronautical Test Range, which provides direct operational support for a wide variety of aeronautical and aerospace programs. During real-time mission support operations, the various functional elements such as radar, tracking and data processing, communications, airborne video acquisition, and telemetry data processing all function in an integrated manner to provide real-time control, monitoring, processing and command uplink capabilities. Post-mission processing is also supplied as support to programs short of the analysis function.

	Permanent Positions (Civil Service)
CENTER MANAGEMENT AND OPERATIONS SUPPORT..	461

Center Management and Operations Support is support or services that are provided to all ARC organizations which cannot be identified exclusively to a single program or project. The civil service personnel involved are as follows:

Director and Staff - The Center Director, Deputy Director, Associate Director, and the immediate staff, e.g., Legal, Patent Counsel, Equal Opportunity, Planning and Analysis, Public Affairs, Resources and Budget Management, Energy Management, and Safety.

Management Support - The part of the ARC civil service workforce who provide information and control services supporting all levels of Center management, both program and functional. Specific functions include resources and financial management, program control, contracting and procurement, property management, personnel management, and management systems and analysis.

Operations Support - The part of the ARC civil service workforce who provide for the operation and maintenance of institutional facilities, buildings, systems, and equipment, including those who manage or provide technical services such as automatic data processing, reliability and quality assurance, medical care, and photographic support.

RESOURCE REQUIREMENTS BY FUNCTION

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of Dollars)		
I. PERSONNEL AND RELATED COSTS	77,916	78,391	81,759	81,957

Summary of Fund Requirements

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
A. Compensation and Benefits				
1. Compensation				
a. Permanent positions...	66,662	67,298	68,768	68,663
b. Other than full-time permanent positions	2,259	2,177	2,251	2,251
c. Reimbursable detailees..................	250	272	311	291
d. Overtime and other compensation	1,024	722	1,103	1,124
subtotal, Compensation	70,195	70,469	72,433	72,329
2. Benefits..................................	6,847	7,029	8,332	8,571
Subtotal, Compensation and Benefits.. ...	77,042	77,498	80,765	80,900
B. Supporting Costs				
1. Transfer of personnel	141	148	210	223
2. Personnel training	733	745	784	834
Subtotal, Supporting Costs..	874	893	994	1,057
Total, Personnel and Related Costs	77,916	78,391	81,759	81,957

Explanation of Fund Requirements

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of Dollars)		
A. Compensation and Benefits..............	77,042	77,498	80,765	80,900
1. Compensation	70,195	70,469	72,433	72,329
a. Permanent positions	66,662	67,298	68,768	68,663

The current estimate for 1983 reflects a change from the 1983 budget estimate due to the 1982 pay increases.

Basis of Cost for Permanent Positions

In 1984, the cost of permanent positions will be $68,663,000. The decrease from 1983 is calculated as follows:

Cost of permanent positions in 1983.		68,768
Cost increases in 1984..............		+1,276
within grade and career development advances:		
Full year effect of 1983 actions....	+685	
Partial year effect of 1984 actions.........................	+534	
Full year effect of 1983 pay increase....................................	+57	
Cost decreases in 1984.........		−1,381
Turnover savings:		
Full year effect of 1983 actions......................................	−417	
Partial effect of 1984 actions..................................... ...	−481	
One less paid day in 1984..	−254	
Alteration in the method of calculation of salaries paid (P.L. 97-253)...	−229	
Cost of permanent positions in 1984.................		68,663

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
	(Thousands of Dollars)			
b. Other than full-time permanent positions				
1. cost................................	2,259	2,177	2,251	2,251
2. Workyears	158	192	166	166

The distribution of 1984 workyears is as follows:

Distribution of Other Than Full-Time Permanent Workyears

Program	Workyears
Development programs..	57
Summer employment program..	11
Youth opportunity programs...	48
Other temporary....	50
Total..	166

The increase in cost and the decrease in workyears from the 1983 budget estimate to the 1983 current estimate reflects a change in emphasis in this program. We are now using fewer but higher skilled and therefore higher cost employees. The estimates also provide for the cost of the 1982 pay increases. The 1984 estimate is level from 1983.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
c. Reimbursable detailees..................	250	272	311	291

The military personnel detailed to the Ames Research Center on a reimbursable basis are individuals experienced in aeronautics, rotorcraft technology, veterinary medicine, and related fields. The increase from the 1983 budget estimate to the 1983 current estimate is due to additional requirements in the life sciences and rotorcraft programs. The reduction in 1984 reflects a small reduction in support to the rotorcraft controls and guidance program.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of Dollars)		
d. Overtime and other compensation..........	1,024	722	1,103	1,124

Overtime and other compensation includes overtime, holiday pay, and incentive awards. The use of overtime and other compensation is primarily for off-shift operation of major facilities such as the Unitary Plan Wind Tunnel System, and the 6-by-6 Foot Supersonic Wind Tunnel, and preparation for test flights and Space Shuttle operations. The increase from the 1983 budget estimate to the 1983 current estimate is caused by additional overtime requirements for the 40-by-80-by-120 Foot Wind Tunnel Project, the HIMAT project, Space Shuttle landing support and the effect of increased 1982 pay costs. The estimate for 1983 and 1984 reflects 1982 experience.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
2. Benefits..................................	6,847	7,029	8,332	8,571

The following are the amounts of contributions by category:

Civil Service Retirement Fund............	4,581	4,769	4,963	4,997
Employee life insurance..................	360	197	187	188
Employee health insurance................	1,469	1,400	1,862	2,009
Workmen's Compensation....................	309	613	429	429
FICA.....................................	52	45	49	50
Medicare.................................	---	---	684	798
Other benefits...........................	76	5	158	100
Total..................................	6,847	7,029	8,332	8,571

The increase from the 1983 budget estimate to the 1983 current estimate is primarily due to the 1.3% Medicare payment, the cost of the 1982 pay increase and higher health benefit rates. The workmen's compensation estimates for 1983 and 1984 reflect estimates based on Department of Labor billings. The increase in the 1984 estimate is due to the full year cost of Medicare payments and health benefits rates.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of Dollars)		
B. Supporting Costs................................	874	893	994	1,057
1. Transfer of personnel.	141	148	210	223

The increase from the 1983 budget estimate to the 1983 current estimate is due to an increase in the number of expected relocations based upon new hiring which was deferred in 1982. Transfers in 1984 are expected to be the same.

2. Personnel training	733	745	784	834

The increase from the 1983 budget estimate to the 1983 current estimate and the 1984 estimate is due to the rise in tuition and other training costs. The 1984 estimate is based on the same level of effort as 1983.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
II. TRAVEL...	1,929	2,109	2,158	2,212

Summary of Fund Requirements

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
A. Program Travel.................................	1,252	1,421	1,430	1,433
B. Scientific and Technical Development Travel.. ...	296	303	317	339
C. Management and Operations Travel...............	381	385	411	440
Total, Travel................................	1,929	2,109	2,158	2,212

Explanation of Fund Requirements

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of Dollars)		
A. Program Travel	1,252	1,421	1,430	1,433

Program travel is required for the accomplishment of the Center's missions and is the largest part of the ARC travel budget, accounting for approximately 65 percent of travel costs in 1984. At ARC, travel for program purposes is required for the continuing efforts in space research, aeronautical research and technology, flight simulation, fluid mechanics, airborne research and applications, space life sciences, flight test techniques, flight measurements, guidance and flight control, and flight measurement development activities. The 1984 estimate provides for the same level as 1983.

B. Scientific and Technical Development Travel	296	303	317	339

Scientific and technical development travel permits employees to participate in meetings and technical seminars with other representatives of the scientific and aerospace community. This participation allows them to benefit from exposure to technological advances outside Ames Research Center, as well as to present both accomplishments and problems to their associates. Many such meetings are working panels convened to solve certain problems for the benefit of the Government. The 1984 estimate provides for presentation of technical papers to the scientific community at approximately the same level as experienced in 1982 and 1983 and provides for expected increases in travel costs.

C. Management and Operations Travel	381	385	411	440

Management and operations travel provides for the direction and coordination of general management matters. It includes travel in such areas as personnel, financial management and procurement; travel of the Center's top management to NASA Headquarters, other NASA Centers, and contractor plants; and local transportation. The increase from the 1983 budget estimate to the 1983 current estimate reflects the additional travel of administrative managers between ARC and DFRF. The 1984 estimate reflects the full year effect of charter service between ARC and DFRF and allows for approximately the same level of travel as in 1983 in addition to expected increases in travel costs.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of Dollars)		
III. OPERATION OF INSTALLATION	**21,209**	**24,393**	**23,457**	**24,666**

Summary of Fund Requirements

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
A. Facilities Services	10,811	14,411	12,618	13,640
B. Technical Services	3,384	2,610	3,339	3,136
C. Management and Operations	7,014	7,372	7,500	7,890
Total, Operation of Installation	21,209	24,393	23,457	24,666

Explanation of Fund Requirements

Operation of Installation provides a broad range of services, supplies, and equipment in support of the Center's institutional activities. These are divided into three major functional areas: Facilities Services, the cost of maintaining and repairing institutional facilities and equipment, and the cost of custodial services and utilities; Technical Services, the cost of automatic data processing for management activities, and the cost of educational and informational programs and technical shops supporting institutional activities; and Management Operations, the cost of administrative communications, printing, transportation, medical, supply, and related services.

The decrease from the 1983 budget estimate to the 1983 current estimate is due to a decrease in electricity usage and rates. This decrease is partially offset by increased Shuttle support costs, higher ADP maintenance and operating costs, and a rate increase in communications. The 1984 estimate provides for expected rate increases for support contractors and utilities.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
A. FACILITIES SERVICES	10,811	14,411	12,618	13,640

ARC is located on 423.5 acres in a complex of facilities made up of laboratory and office-type buildings as well as research wind tunnels. This complex encompasses 2,101,754 gross square feet of building space including 10 major buildings. Also included are 11 major technical facilities. This physical plant supports an average daily population of 2,500 to 2,900 personnel. Many of the facilities are utilized on schedules involving more than one shift and frequently during off-peak hours.

DFRF is located on 521 acres and occupies a complex of facilities consisting of laboratory and office-type buildings as well as flight test facilities. This complex encompasses 501,578 gross square feet of office building space including eight major facilities. This physical plant houses an average daily onsite population of 900 to 1,200 personnel. Many of the test facilities are utilized on schedules involving more than one shift, which frequently operate during off-peak hours.

Summary of Fund Requirements

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
	(Thousands of Dollars)			
1. Rental of Real Property	73	117	133	142
2. Maintenance and Related Services	2,446	2,504	2,411	2,542
a. Facilities	2,391	2,443	2,368	2,496
b. Equipment	55	61	43	46
3. Custodial Services	3,007	3,524	3,474	3,656
4. Utility Services	5,285	8,266	6,600	7,300
Total, Facilities Services	10,811	14,411	12,618	13,640

Explanation of Fund Requirements

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
	(Thousands of Dollars)			
1. Rental of Real Property......................	73	117	133	142

At DFRF, this item provides for the rental of trailers to provide office, shop, laboratory, and storage space in support of the Space Shuttle program. The increase from the 1983 budget estimate to the 1983 current estimate and to the 1984 budget estimate reflects the same level of rentals at estimated cost rates.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
2. Maintenance and Related Services..............	2,446	2,504	2,411	2,542

At ARC, maintenance and repair includes the maintenance of grounds and emergency repairs of heating, ventilating, and lighting equipment in the institutional buildings and offices. Maintenance of grounds includes maintenance of approximately 30 acres of improved planted areas and associated pest control; maintenance of approximately 45 acres of unimproved areas such as substations, aircraft taxiways, drainage ditches, large fields and roadway shoulders within these areas; and vacuum sweeping approximately 42 acres of streets, parking lots, and aircraft ramp, taxiway and V/STOL areas. At DFRF, this activity involves all DFRF facilities, including those used for Shuttle.

The 1983 current estimate provides a continuation of the 1982 level of maintenance and repair effort. The 1984 estimate reflects cost increases in purchased goods and services and higher support contractor rates at DFRF and provides for the same level of effort at anticipated price levels.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
3. Custodial Services...........................	3,007	3,524	3,474	3,656

Janitorial and building cleaning services are associated with approximately two million square feet of various types of space located in 131 buildings, and 72 trailers which provide temporary office and shop space. Security services are for buildings and property, including aircraft and computer facilities, and "round-the-clock" staffing of an emergency duty office which monitors fire, security, and safety alarms, and coordinates fire, security, and safety areas in emergency situations. Other services included are pest control services, refuse collection, laundry and custodial supplies.

This activity involves support contractor efforts which provide janitorial and security services, fire protection provided by the Navy at ARC and other miscellaneous custodial services and supplies. The decrease from the 1983 budget estimate to the 1983 current estimate reflects a small decrease in support service contract effort. The increase in 1984 provides for the same level of effort at negotiated support contractor rates.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
	(Thousands of Dollars)			
4. Utility Services	5,285	8,266	6,600	7,300

The major utility service is electricity with lesser requirements for natural gas, fuel oil, water and sewage services.

At ARC, electricity is provided by the U.S. Bureau of Reclamation's Central Valley Project, marketed by the Western Area Power Administration of the Department of Energy, and the Pacific Gas and Electric Company (PG&E); natural gas is provided by PG&E; water by the U.S. Naval Air Station at Moffett Field; and sewage service by the City of Mountain View.

Approximately 80 percent of the electric power at ARC is consumed in the operation of high power demand research facilities, such as: the Unitary Plan Wind Tunnel System, the 14-foot transonic wind tunnel, and the operation of simulators and smaller wind tunnels. Approximately 55 percent of the natural gas is used in research facilities; the other part is used for heating and ventilation of institutional buildings. ARC, Moffett Field, accounts for 95 percent of the overall utility energy usage and 91 percent of total utility costs.

At DFRF, utility services are purchased through Air Force contracts with regional utility companies. Costs are based on Air Force projected rates. The major amount is for electricity with lesser amounts for natural gas, fuel oil, water and sewage services.

The decrease between the 1983 budget estimate and the 1983 current estimate is primarily in electricity consumption and rates. The consumption in the 1983 current estimate and the 1984 budget estimate is level. The 1984 increase is due to rate escalation.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of Dollars)		
B. TECHNICAL SERVICES..............................	3,384	2,610	3,339	3,136

Summary of Fund Requirements

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
1. Automatic Data Processing	2,372	1,878	2,321	2,251
a. Equipment	589	251	200	229
b. Operations..	1,783	1,627	2,121	2,022
2. Scientific and Technical Information.........	677	524	762	615
a. Library..	44	23	20	21
b. Education and Information................	633	501	742	594
3. Shop and Support Services....................	335	208	256	270
Total, Technical Services..................	3,384	2,610	3,339	3,136

Explanation of Fund Requirements

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
1. Automatic Data Processing.....................	2,372	1,878	2,321	2,251

This category includes the administrative ADP facility equipment and operating costs.

The increase from the 1983 budget estimate to the 1983 current estimate provides for increased software systems support, higher maintenance costs and the acquisition of user terminals and other hardware and software to provide interactive capability to the system that was purchased in 1981 to assure the smooth functioning of the administrative ADP data systems between ARC and DFRF. The 1984 estimate provides for the recurring costs of administrative computer operations partially offset by the completion of the management information system study which was completed in 1983.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of Dollars)		
2. Scientific and Technical Information.........	677	524	762	615

Provides for the purchase of books, supplies, and materials for the operation of the DFRF library. Also included in this category is a support contract to perform public information services, media development, and education programs. Public information services supporting the Shuttle activities at DFRF are increasing from 1982 to 1983 due to Space Shuttle requirements changes. The 1984 estimate reflects a reduction in Space Shuttle public affairs requirements.

3. Shop and Support Services....................	335	208	256	270

This category includes administrative shop, photo and graphics, and audiovisual services primarily supporting the public affairs activity. The increase from 1983 budget estimate to 1983 current estimate reflects an increase in support contractor effort in support of the Space Shuttle requirements. The 1984 estimate provides for a continuation of the 1983 level of effort.

C. MANAGEMENT AND OPERATIONS.........................	7,014	7,372	7,500	7,390

Summary of Fund Requirements

1. Administrative Communications.................	2,171	2,329	2,442	2,596
2. Printing and Reproduction	272	293	285	303
3. Transportation	807	907	883	984
4. Installation Common Services.................	3,764	3,843	3,890	4,007
Total, Management and Operations	7,014	7,372	7,500	7,890

Explanation of Fund Requirements

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of Dollars)		
1. Administrative Communications................	2,171	2,329	2,442	2,596

Communications services are provided by the General Services Administration (GSA) for the Federal Telecommuniations Service (FTS), and the Pacific Telephone and Telegraph Company and the General Telephone and Telegraph Company for local services at Ames and DFRF, respectively. Other communications consist of teletype equipment and services provided by Western Union. Also included are the lease of switchboard equipment and the support contract for telephone operators. The increase from the 1983 budget estimate to the 1983 current estimate is due to an increase in local communication costs at DFRF and higher FTS rates. The 1984 estimate will maintain the same level of services as 1983 at anticipated cost levels.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
2. Printing and Reproduction	272	293	285	303

The estimate for administrative printing includes the operating costs of the printing and reproduction facility as well as supplies, materials, equipment acquisitions and outside procurements. All common processes of duplication, including photostating, blueprinting and microfilming are included. The 1983 current estimate and the 1984 budget estimate reflect approximately the same level of activity as in 1982.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
3. Transportation.	807	907	883	984

The estimates include motor pool operation costs including GSA vehicle rentals, freight costs, Government bills of lading, air freight and other general shipments. The decrease in the 1983 current estimate is due to reduced Space Shuttle support requirements. The 1984 budget estimate reflects support contractor rate escalation and costs associated with DFRF being a primary and contingency landing site for the increasing number of Space Shuttle flights.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
4. Installation Common Services..................	3,764	3,843	3,890	4,007

These services include center management and staff activities, medical services, and installation support services activities. For example, this category includes those supplies, materials and services in support of Center management, general and patent legal services, personnel, procurement, and financial management services. Medical services include the staffing of the health units, laboratory service fees, clinic supplies, and maintenance of clinic equipment. Installation support services provide contractor support for supply and property management, mail, pickup and delivery services, and postage. The 1983 current estimate and the 1984 budget estimate maintains the same level of effort as in 1982 adjusted for support service contract wage escalation.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

ORGANIZATION AND STAFFING CHART

AMES RESEARCH CENTER

CENTER TOTAL

	83	84
SES	36	36
GS-16	1	1
GS/GM-15	111	111
GS/GM-14	266	266
ALL OTHER GS/GM	1299	1298
WAGE GRADE	300	300
TOTAL PERMANENT	2021	2021

*INCLUDES 1 NASA EXCEPTED

DIRECTOR

	83	84
GS/GM-15		
GS/GM-14		
ALL OTHER GS/GM	8	
WAGE GRADE	—	—
TOTAL PERMANENT	15	15

PUBLIC AFFAIRS OFFICE

	83	84
SES	—	—
GS-16	—	—
GS/GM-15	—	—
GS/GM-14	2	2
ALL OTHER GS/GM	8	8
WAGE GRADE	—	—
TOTAL PERMANENT	10	10

PATENT COUNSEL

	83	84
SES	—	—
GS-16	—	—
GS/GM-15	1	1
GS/GM-14	—	—
ALL OTHER GS/GM	1	1
WAGE GRADE	—	—
TOTAL PERMANENT	2	2

INSTITUTIONAL OPERATIONS OFFICE

	83	84
SES	—	—
GS-16	—	—
GS/GM-15	1	1
GS/GM-14	3	3
ALL OTHER GS/GM	8	8
WAGE GRADE	—	—
TOTAL PERMANENT	12	12

CHIEF COUNSEL

	83	84
SES	—	—
GS-16	—	—
GS/GM-15	3	3
GS/GM-14	—	—
ALL OTHER GS/GM	2	2
WAGE GRADE	—	—
TOTAL PERMANENT	5	5

EQUAL OPPORTUNITY PROGRAMS OFFICE

	83	84
SES	—	—
GS-16	—	—
GS/GM-15	—	—
GS/GM-14	—	—
ALL OTHER GS/GM	5	5
WAGE GRADE	—	—
TOTAL PERMANENT	5	5

RESOURCES MANAGEMENT OFFICE

	83	84
SES	—	—
GS-16	—	—
GS/GM-15	1	1
GS/GM-14	1	1
ALL OTHER GS/GM	11	11
WAGE GRADE	—	—
TOTAL PERMANENT	13	13

DIRECTOR OF AERONAUTICS & FLIGHT SYSTEMS

	83	84
SES	2	2
GS-16	—	—
GS/GM-15	—	—
GS/GM-14	1	1
ALL OTHER GS/GM	3	3
WAGE GRADE	—	—
TOTAL PERMANENT	6	6

AERODYNAMICS DIVISION

	83	84
SES	1	1
GS-16	—	—
GS/GM-15	4	4
GS/GM-14	23	23
ALL OTHER GS/GM	75	75
WAGE GRADE	32	32
TOTAL PERMANENT	135	135

DRYDEN AERONAUTICAL PROJECTS OFFICE

	83	84
SES	1	1
GS-16	—	—
GS/GM-15	3	3
GS/GM-14	3	3
ALL OTHER GS/GM	16	16
WAGE GRADE	—	—
TOTAL PERMANENT	23	23

HELICOPTER AND POWERED LIFT TECHNOLOGY DIVISION

	83	84
SES	1	1
GS-16	—	—
GS/GM-15	10	10
GS/GM-14	14	14
ALL OTHER GS/GM	79	79
WAGE GRADE	19	19
TOTAL PERMANENT	123	123

FLIGHT SYSTEMS AND SIMULATION RESEARCH DIVISION

	83	84
SES	1	1
GS-16	1	1
GS/GM-15	9	9
GS/GM-14	25	25
ALL OTHER GS/GM	84	84
WAGE GRADE	1	1
TOTAL PERMANENT	121	121

GALILEO PROBE PROJECT OFFICE

	83	84
SES	—	—
GS-16	—	—
GS/GM-15	1	1
GS/GM-14	6	6
ALL OTHER GS/GM	12	12
WAGE GRADE	—	—
TOTAL PERMANENT	19	19

DIRECTOR OF ASTRONAUTICS

	83	84
SES	2	2
GS-16	—	—
GS/GM-15	1	1
GS/GM-14	1	1
ALL OTHER GS/GM	7	7
WAGE GRADE	—	—
TOTAL PERMANENT	11	11

AIRBORNE MISSIONS AND APPLICATIONS DIVISION

	83	84
SES	1	1
GS-16	—	—
GS/GM-15	6	6
GS/GM-14	15	15
ALL OTHER GS/GM	41	41
WAGE GRADE	—	—
TOTAL PERMANENT	63	63

NUMERICAL AERODYNAMIC SIMULATOR

	83	84
SES	—	—
GS-16	—	—
GS/GM-15	5	5
GS/GM-14	7	7
ALL OTHER GS/GM	16	16
WAGE GRADE	—	—
TOTAL PERMANENT	28	28

SPACE SCIENCE DIVISION

	83	84
SES	1	1
GS-16	—	—
GS/GM-15	20	20
GS/GM-14	23	23
ALL OTHER GS/GM	71	71
WAGE GRADE	—	—
TOTAL PERMANENT	115	115

THERMO- AND GAS-DYNAMICS DIVISION

	83	84
SES	2	2
GS-16	—	—
GS/GM-15	13	13
GS/GM-14	24	24
ALL OTHER GS/GM	87	87
WAGE GRADE	22	22
TOTAL PERMANENT	148	148

CHEMICAL RESEARCH PROJECTS OFFICE

	83	84
SES	—	—
GS-16	—	—
GS/GM-15	1	1
GS/GM-14	2	2
ALL OTHER GS/GM	11	11
WAGE GRADE	—	—
TOTAL PERMANENT	14	14

SIRTF STUDY OFFICE

	83	84
SES	—	—
GS-16	—	—
GS/GM-15	1	1
GS/GM-14	2	2
ALL OTHER GS/GM	5	5
WAGE GRADE	—	—
TOTAL PERMANENT	8	8

DIRECTOR OF FLIGHT OPERATIONS

	83	84
SES	4	4
GS-16	—	—
GS/GM-15	—	—
GS/GM-14	1	1
ALL OTHER GS/GM	2	2
WAGE GRADE	—	—
TOTAL PERMANENT	7	7

SAFETY AND QUALITY ASSURANCE OFFICE

	83	84
SES	—	—
GS-16	—	—
GS/GM-15	—	—
GS/GM-14	1	1
ALL OTHER GS/GM	6	6
WAGE GRADE	—	—
TOTAL PERMANENT	7	7

SHUTTLE PROJECT OFFICE

	83	84
SES	1	1
GS-16	—	—
GS/GM-15	—	—
GS/GM-14	1	1
ALL OTHER GS/GM	1	1
WAGE GRADE	—	—
TOTAL PERMANENT	3	3

FLIGHT SUPPORT DIVISION

	83	84
SES	1	1
GS-16	—	—
GS/GM-15	3	3
GS/GM-14	22	22
ALL OTHER GS/GM	101	101
WAGE GRADE	—	—
TOTAL PERMANENT	127	'127

DRYDEN AIRCRAFT OPERATIONS DIVISION

	83	84
SES	3*	3*
GS-16	—	—
GS/GM-15	3	3
GS/GM-14	5	5
ALL OTHER GS/GM	90	90
WAGE GRADE	70	70
TOTAL PERMANENT	171	171

AMES AIRCRAFT OPERATIONS DIVISION

	83	84
SES	1	1
GS-16	—	—
GS/GM-15	6	6
GS/GM-14	6	6
ALL OTHER GS/GM	31	31
WAGE GRADE	47	47
TOTAL PERMANENT	91	91

DIRECTOR OF LIFE SCIENCES

	83	84
SES	2	2
GS-16	—	—
GS/GM-15	—	—
GS/GM-14	1	1
ALL OTHER GS/GM	3	3
WAGE GRADE	—	—
TOTAL PERMANENT	6	6

BIOMEDICAL RESEARCH DIVISION

	83	84
SES	1	1
GS-16	—	—
GS/GM-15	1	1
GS/GM-14	14	14
ALL OTHER GS/GM	21	21
WAGE GRADE	—	—
TOTAL PERMANENT	37	37

BIOSYSTEMS DIVISION

	83	84
SES	1	1
GS-16	—	—
GS/GM-15	2	2
GS/GM-14	7	7
ALL OTHER GS/GM	24	24
WAGE GRADE	—	—
TOTAL PERMANENT	34	34

EXTRATERRESTRIAL RESEARCH DIVISION

	83	84
SES	1	1
GS-16	—	—
GS/GM-15	2	2
GS/GM-14	7	7
ALL OTHER GS/GM	22	22
WAGE GRADE	—	—
TOTAL PERMANENT	32	32

MAN-VEHICLE SYSTEMS RESEARCH DIVISION

	83	84
SES	1	1
GS-16	—	—
GS/GM-15	3	3
GS/GM-14	6	6
ALL OTHER GS/GM	23	23
WAGE GRADE	—	—
TOTAL PERMANENT	33	33

DIRECTOR OF ENGINEERING AND COMPUTER SYSTEMS

	83	84
SES	1	1
GS-16	—	—
GS/GM-15	1	1
GS/GM-14	3	3
ALL OTHER GS/GM	5	5
WAGE GRADE	—	—
TOTAL PERMANENT	10	10

COMPUTER SYSTEMS DIVISION

	83	84
SES	1	1
GS-16	—	—
GS/GM-15	2	2
GS/GM-14	8	8
ALL OTHER GS/GM	55	55
WAGE GRADE	—	—
TOTAL PERMANENT	66	66

SYSTEMS ENGINEERING DIVISION

	83	84
SES	1	1
GS-16	—	—
GS/GM-15	4	4
GS/GM-14	16	16
ALL OTHER GS/GM	116	116
WAGE GRADE	1	1
TOTAL PERMANENT	138	138

TECHNICAL SERVICES DIVISION

	83	84
SES	—	—
GS-16	—	—
GS/GM-15	—	—
GS/GM-14	1	1
ALL OTHER GS/GM	28	28
WAGE GRADE	108	108
TOTAL PERMANENT	137	137

DIRECTOR OF ADMINISTRATION

	83	84
SES	1	1
GS-16	—	—
GS/GM-15	1	1
GS/GM-14	1	1
ALL OTHER GS GM	3	3
WAGE GRADE	—	—
TOTAL PERMANENT	6	6

FINANCIAL MANAGEMENT DIVISION

	83	84
SES	—	—
GS-16	—	—
GS/GM-15	1	1
GS/GM-14	2	2
ALL OTHER GS/GM	48	48
WAGE GRADE	—	—
TOTAL PERMANENT	51	51

PERSONNEL DIVISION

	83	84
SES	—	—
GS-16	—	—
GS/GM-15	1	1
GS/GM-14	2	2
ALL OTHER GS/GM	41	41
WAGE GRADE	—	—
TOTAL PERMANENT	44	44

PROCUREMENT DIVISION

	83	84
SES	—	—
GS-16	—	—
GS/GM-15	1	1
GS/GM-14	5	5
ALL OTHER GS/GM	74	74
WAGE GRADE	—	—
TOTAL PERMANENT	80	80

DRYDEN INSTITUTIONAL SUPPORT OFFICE

	83	84
SES	—	—
GS-16	—	—
GS/GM-15	—	—
GS/GM-14	—	—
ALL OTHER GS/GM	6	6
WAGE GRADE	—	—
TOTAL PERMANENT	6	6

TECHNICAL INFORMATION DIVISION

	83	84
SES	—	—
GS-16	—	—
GS/GM-15	—	—
GS/GM-14	1	1
ALL OTHER GS/GM	26	26
WAGE GRADE	3	3
TOTAL PERMANENT	30	30

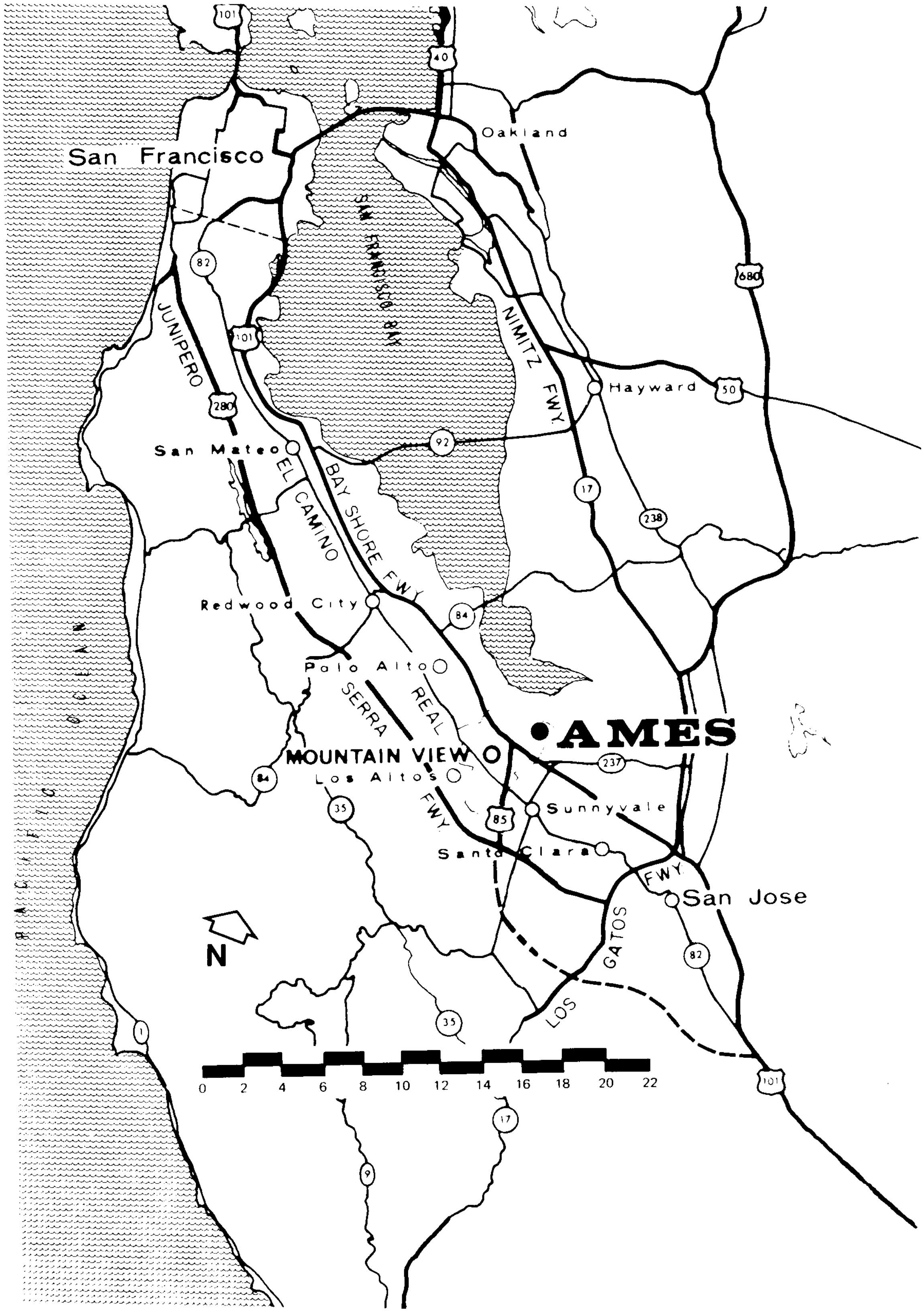
SERVICES AND SUPPLY DIVISION

	83	84
SES	—	—
GS-16	—	—
GS/GM-15	—	—
GS/GM-14	—	—
ALL OTHER GS/GM	22	22
WAGE GRADE	5	5
TOTAL PERMANENT	27	27

UNIVERSITY AFFAIRS OFFICE

	83	84
SES	—	—
GS-16	—	—
GS/GM-15	—	—
GS/GM-14	1	1
ALL OTHER GS/GM	1	1
WAGE GRADE	—	—
TOTAL PERMANENT	2	2

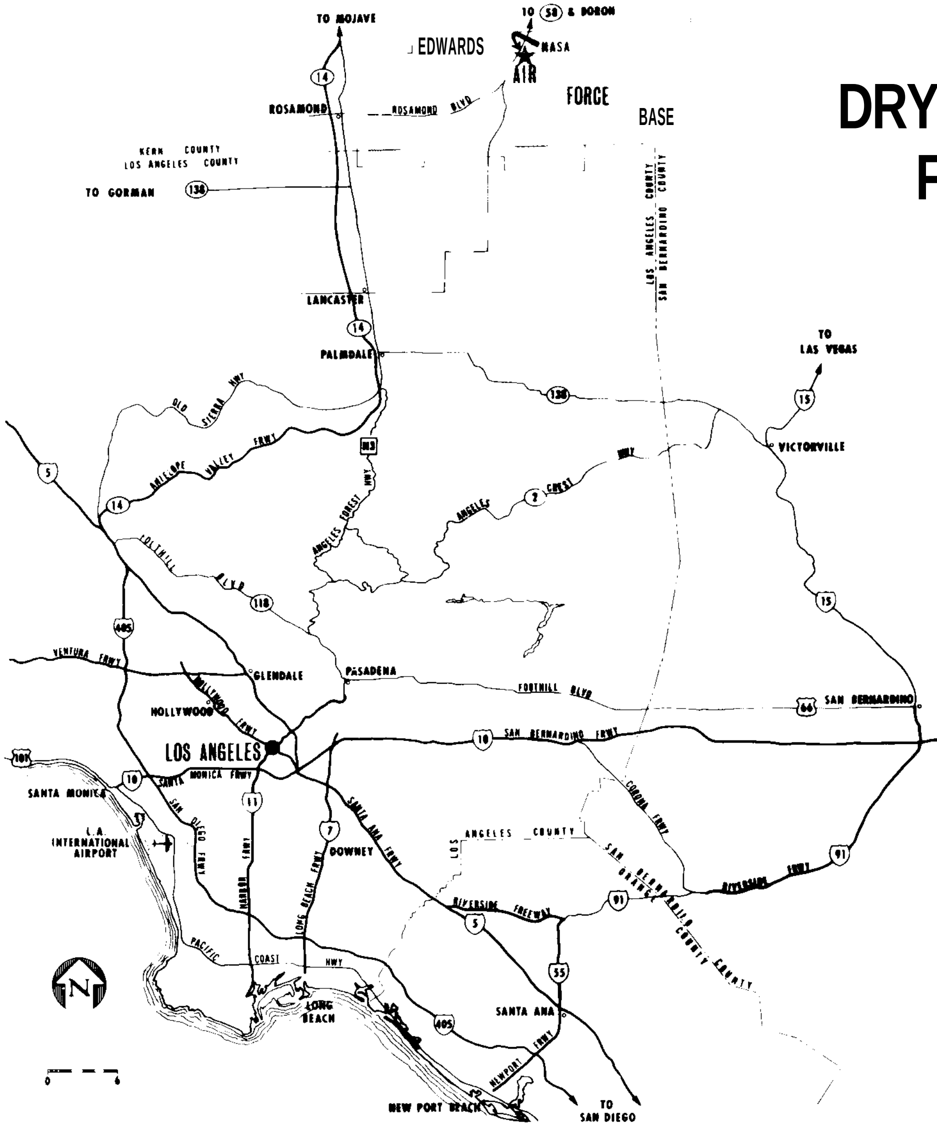
LOCATION MAP
FISCAL YEAR 1984 ESTIMATES

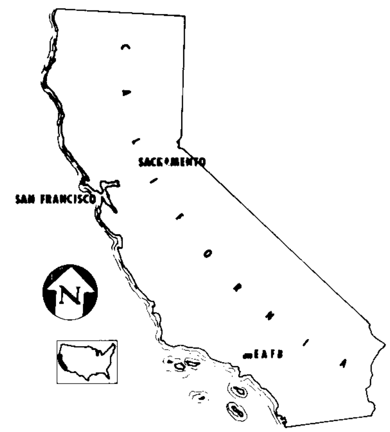


AMES RESEARCH CENTER
FISCAL YEAR 1984 ESTIMATES
AERIAL VIEW

RPM 6-31

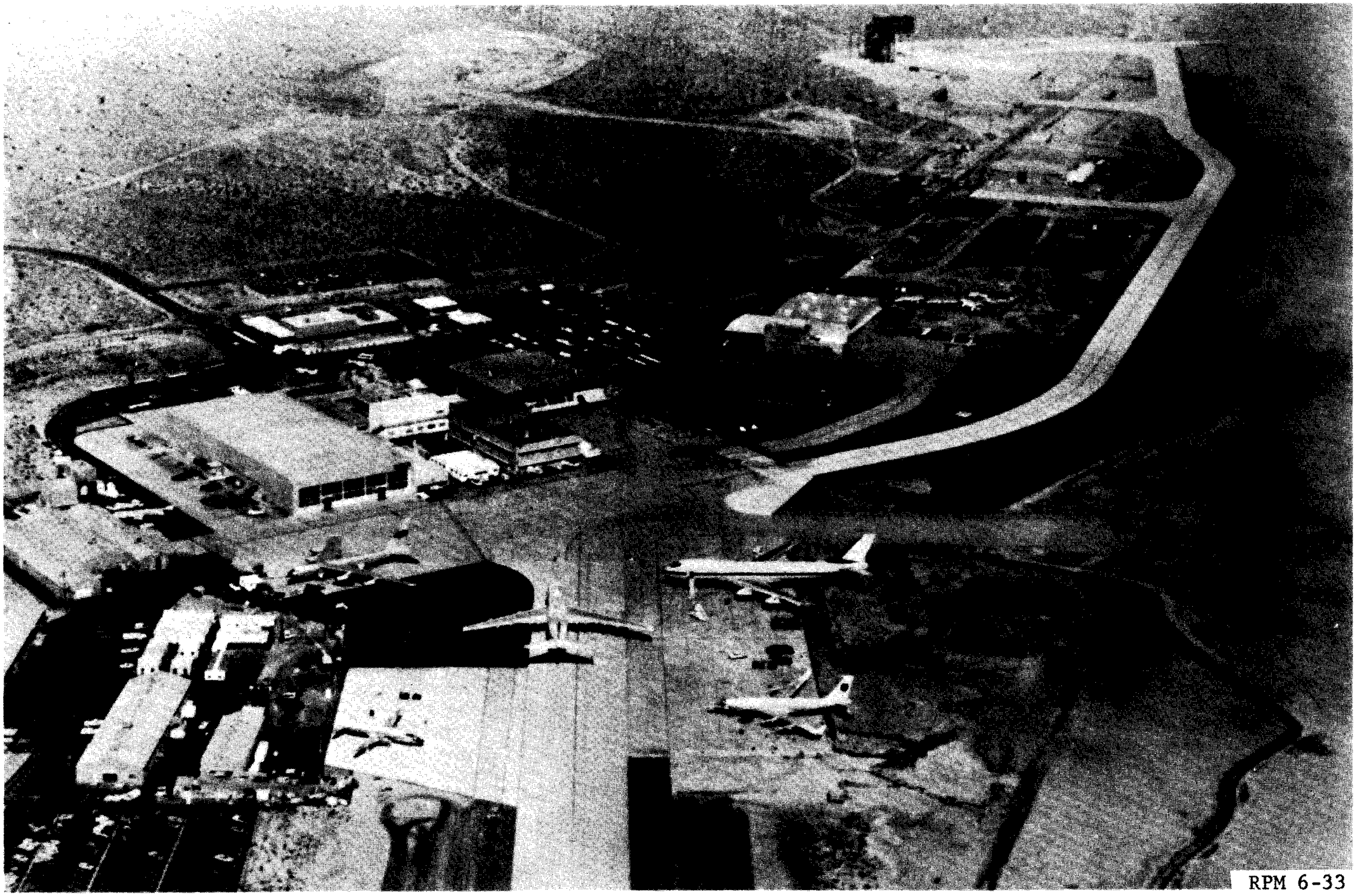
DRYDEN FLIGHT RESEARCH FACILITY
FISCAL YEAR 1984 ESTIMATES
AREA MAP





KEY PLAN

HUGH L. DRYDEN FLIGHT RESEARCH FACILITY
FISCAL YEAR 1984 ESTIMATES



RPM 6-33

LANGLEY
RESEARCH CENTER

RESEARCH AND PROGRAM MANAGEMENT

FISCAL YEAR 1984 ESTIMATES

LANGLEY RESEARCH CENTER

DESCRIPTION

The Langley Research Center, (LaRC) located at Hampton, Virginia, was established in 1917. It is situated between Norfolk and Williamsburg, Virginia, in the tidewater area of Hampton Roads. The Center utilizes 807 acres of Government-owned land, divided into two areas by the runway facilities of Langley Air Force Base. The West Area consists of 787 acres all owned by NASA. The East Area comprises 20 acres under permit from the Air Force. Runways, some utilities, and certain other facilities are used jointly by NASA and the Air Force. In addition, there are 110 acres of NASA-owned land located in the city of Newport News, Virginia, and 3,276 acres under permit from the Department of Interior. The total capital investment of the Langley Research Center, including fixed assets in progress and contractor-held facilities at various locations, as of September 30, 1982, was $675,091,000.

CENTER ROLES AND MISSIONS

LaRC continues to play a leading role in the development of aeronautics and space technology in the United States.

LaRC has developed recognized areas of technical excellence within the civil service staff and facilities of superior merit; that is, major technical facilities which constitute a National resource. The principal and supporting roles are:

PRINCIPAL

Long-Haul Aircraft Technology - develop a technology base for improving long-haul aircraft as a cost effective, safe, and environmentally compatible transportation mode.

General Aviation and Commuter Aircraft Technology - develop and maintain an engineering technology base related to improving general aviation and commuter aircraft.

Fundamental Aerodynamics - advance the general state of the art, both theoretical and experimental.

Acoustics and Noise Reduction - conduct research and develop a technology base related to reducing interior and exterior aircraft noise.

Aerospace Vehicle Structures and Materials - develop a technology base for potential advances.

Guidance and Control Technology - develop a technology base related to improving aircraft control and guidance systems.

Military Support - provide technical support to military aviation in areas consistent with other LaRC aeronautics roles and unique capabilities.

Advanced Space Vehicle Configurations Technology - develop a technology base related to advanced configurations, including advanced space transportation concepts.

Sensor and Data Acquistion Technology - develop a technology base for sensors and data acquistion devices.

Technology Experiments in Space - develop and manage the Long Duration Exposure Facility. Define and develop experiments in areas consistent with other LaRC space roles.

Atmospheric Sciences Technology - develop improved techniques for atmospheric sensing. Includes research, experiment development/management, data analysis, and investigator management and specialized ground/aircraft investigations. This also includes development of Shuttle payloads related to atmospheric sensing.

SUPPORTING

Rotorcraft Technology - contribute to the development of the technology base with emphasis on structures, aeroelasticity, acoustics, noise, and avionics components.

Hypersonic Propulsion Systems - Contribute to technology base of airbreathing propulsion systems by advancing the state of the art of hypersonic propulsion.

Planetary Entry Technology - provide planetary and entry aerothermodynamics experimental and analytical data.

Computational Fluid Dynamics - contribute to the software technology base.

Upper Atmospheric Research - mission analysis, sensor development, data interpretation, and utilization for remote sensing; contributing to model development.

Launch Vehicle Procurement - development and procurement for science/applications missions, including Scout launch vehicle.

SUMMARY OF RESOURCES REQUIREMENTS

Funding Plan by Function

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of Dollars)		
I. Personnel and Related Costs..........	101,234	100,654	107,436	108,351
11. Travel..............................	1,984	2,536	2,185	2,325
III. Operation of Installation............	23,373	28,113	24,568	28,405
A. Facilities Services................	(12,696)	(17,498)	(14,039)	(16,256)
B. Technical Services................	(4,223)	(3,452)	(3,058)	(4,124)
C. Management and Operations..........	(6,454)	(7,163)	(7,471)	(8,025)
Total, fund requirements.........	126,591	131,303	134,189	139,081

Distribution of Permanent Positions by Program

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
Direct Positions				
Space Transportation System	42	30	37	32
Space transportation capability development	16	1	6	6
Space transportation operations	26	29	31	26
Space Science and Applications	208	195	188	188
Life science	3	1	6	6
Space applications	205	194	182	182
Technology Utilization	8	8	11	9
Aeronautics and Space Technology	1.890	1.904	1.901	1.943
Aeronautical research and technology	1,381	1.389	1.378	1.415
Space research and technology	509	515	523	528
Subtotal. direct positions	2.148	2.137	2.137	2.172
Center Management and Operations Support	718	708	708	673
Total. permanent positions	2.866	2.845	2.845	2845

PROGRAM DESCRIPTION

	Permanent Positions (Civil Service)
SPACE TRANSPORTATION CAPABILITY DEVELOPMENT....................................	6

The objective of this work is to evaluate alternate crew safety strategies for near- and far-term space mission scenarios; to establish safety criteria and identify technology requirements to meet those criteria; and to perform design synthesization, analytical modeling, and systems analysis and evaluation tasks on competing space station technology concepts.

SPACE TRANSPORTATION OPERATIONS..	26

The expendable launch vehicle program at LaRC provides centralized procurement of the Scout launch vehicle. In 1984, civil service personnel will support a program which includes the procurement of launch vehicle hardware, launch services, engineering, and manintenance. Launches under this program will be conducted from sites located at the Western Space and Missile Center in California, and Wallops Flight Center, Wallops Island, Virginia.

LIFE SCIENCES.......................	6

This research brings together an interdisciplinary program to investigate hypotheses concerning the role of wetland ecosystems in the global methane cycle and the concentration and flux of organic carbon.

SPACE APPLICATIONS...	182

The space applications program at LaRC provides a national research capability for understanding the environment and for developing related atmospheric sensing systems and techniques. The Center's technical expertise is widely recognized in the areas of remote sensing of the Earth's atmospheric trace species and of theoretical and empirical atmospheric modeling. In the area of Upper Atmospheric Research, LaRC civil service personnel will continue to study the Earth's atmosphere to assess any changes caused by man and determine whether or not there is any associated change in the transmission of solar radiation. Efforts will continue in constituents and other characteristics, as well as characteristics of Earth features.

A significant improvement in the understanding of man's impact on the stratosphere and climate will be obtained from the combination of Langley-developed statistical/theoretical models and the comprehensive global data set provided by spaceborne sensors such as Nimbus-7, LIMS, SAM 11, and SAGE.

The Center's sensor development program encompasses the broadest possible range of advanced remote sensing techniques, including correlation gas filter radiometry and interferometry, laser heterodyne radiometry, lidar, and active and passive microwave techniques. The second launch of the MAPS instrument will occur in **1984** aboard the OSTA-3 payload.

The Center is administering, managing, and participating in the NASA Global Tropospheric Experiment (GTE), an element of the NASA air quality program. The GTE is a coordinated program of theoretical modeling, field measurements, data analysis, and technology development to contribute to the enhanced understanding of the chemical and dynamic processes of the global troposphere.

Studies of the Earth's radiation budget will be fundamental to the understanding of climate phenomena. LaRC has the responsibility for the science, sensor development, and data management for the Earth Radiation Budget Experiment, a prime element in NASA's support of the National Climate Program. Preliminary radiation budget studies, based on Nimbus data, are examining the relationship of radiation budget to such climatological parameters as cloudiness, snow and ice cover, and sea surface temperature. It is assumed that the Goddard Space Flight Center's Earth Radiation Budget Experiment Satellite, equipped with LaRC instruments, will be launched in **1984.**

	Permanent Positions (Civil Service)
TECHNOLOGY UTILIZATION...	9

The overall objective of the NASA technology utilization program is to enhance economic growth and contribute to the technological solution of public problems through the transfer of new technology resulting from aeronautical and space research and development efforts to the nonaerospace segments of the economy.

In **1984,** civil service personnel will provide the following support: expedite the application of new technology by compressing the time required from generation of technology to its use in the economy: encourage the use of aerospace technology in nonaerospace segments of the economy having problems amenable to technological solutions: and understand more fully the technology transfer process and its impact and systematically manage and optimize the process.

	Permanent Positions (Civil Service)
AERONAUTICAL RESEARCH AND TECHNOLOGY...	1,415

The aeronautical and research technology program at LaRC is characterized by the dynamic interaction between a broad spectrum of technical disciplines, the application of discipline research to specific technology requirements, demonstrations of particular technology applications, and the in-depth examination of future technology requirements. The unique wind tunnel, computing and flight operations capabilities at LaRC complement the expertise of the technical staff to produce a broad cohesive program in aeronuatical research.

The aerodynamics activity at LaRC encompasses extensive theoretical and experimental activities. Basic work in fluid and flight mechanics involves theoretical and experimental determination of aerodynamic flows and complex aircraft motions. The program utilizes the unique LaRC capabilities made possible by the Cyber 203 computer and recently developed cryogenic wind tunnel testing capability provided in the National Transonic Facility which allows the full simulation of flight conditions.

Aspects of the problems which are studied include airfoil and wing design, flow field analysis, configuration design processes, aircraft noise prediction, control analysis, aircraft drag reduction, propulsion system integration, flight dynamics, and fighter and missile aerodynamics. Wind tunnel testing techniques will be further enhanced by the development of methods to minimize interference from tunnel walls, mounting systems, and instrumentation. The Cyber 203 computer will be used in the areas of far-field noise, three-dimensional (3-D) potential flow programs, and the solution of 2-D and 3-D Navier-Stokes equations. Generation and documentation of the aerodynamic characteristics of both turbulent and laminar flow airfoils will be furthered by the introduction of new designs and the test evaluation and flight research of these concepts. Application of advanced transonic theories to the design of improved 3-D wings will be continued and evaluated by wind tunnel tests. Wind tunnel and flight research will be continued on general aviation aircraft configurations having the potential for practical stall immunity and means for spin avoidance. Basic research will continue on the conception and development of methods for reducing turbulent skin friction drag for aeronautical vehicles.

Activities in acoustics and noise reduction include research on jet noise, propeller noise, interior noise, rotor blade noise, atmospheric propagation, structure-borne noise, and system noise prediction.

The materials and structures effort is directed at the development of new and improved structural materials, manufacturing processes, and design technology to improve the structural efficiency, reliability, and durability and to reduce design costs of airframes and components. This activity is focused on research on advanced composite materials, advanced metallic materials, computer-aided analysis and design technology, and development for minimization of aeroelastic response, reduced static stability, and minimization of gust and maneuver loads is being pursued in both theoretical and wind tunnel studies.

Emerging technological advances in computer systems are being exploited to significantly increase the utility and reduce the cost of engineering computations. Investigations of advanced computer hardware applications will be continued with a finite element structural computational device using microprocessor components to evaluate the potential of reducing computational costs and/or times over present analysis methods.

Controls and guidance work at LaRC includes research programs to advance technology development in aircraft guidance and navigation, aircraft control systems, cockpit systems, and integration and interfacing techniques. Also, major efforts in aircraft flight-path management and operations technology and active controls technology for conventional-takeoff-and-landing aircraft are being conducted in this program area. The work includes requirement analyses, design studies, systems and component technology improvement, ground simulation, and experimental flight research. The LaRC expertise in the controls and guidance area is being applied to advanced control laws for various aircraft classes, intersystems communications networks for enhanced interfacing and integration of functions within an aircraft, and advanced technology for improved display media and pilot/system interfaces in aircraft cockpits. Emphasis in 1984 will be on: continued investigations of the capacity, efficiency, and safety potential of cockpit display of air traffic information concepts with elements of an advanced air traffic control system; the definition of technology for enhanced function and hardware integration to increase aircraft systems reliability and reduce operating cost; the definition of requirements and technology to facilitate general aviation single-pilot flight management in Instrument Flight Rules environments; and the investigation of concepts and technology which will result in greatly improved displays and input/output capabilities. Other technology applications also are found in work on advanced digital flight control systems, fluidics instrumentation, and the development of mathematical tools to investigate and enchance reliability prediction and assessment, control algorithm design, and pilot describing functions. Increased utilization will be made of the Avionics Integration Research Laboratory, a major new facility for fault-tolerant systems research opened in 1983.

LaRC has traditionally received requests from other agencies and industry for test support of their aircraft, missiles, and system development programs. The Structures Laboratory of the Army Research and Technology Laboratories of the U.S. Army Aviation Research and Development Command is located at LaRC. This laboratory, the primary investigator of Army rotorcraft structures, works on independent research and development projects and on projects of mutual interest with a staff integrated into the NASA organization. Extensive use is made of LaRC facilities in these research activities. There are also a large number of joint programs with the Air Force Systems Command, the Naval Air System Command, and the Federal Aviation Administration.

	Permanent Positions (Civil Service)
SPACE RESEARCH AND TECHNOLOGY..	528

The space research and technology program at LaRC is characterized by work in several discipline areas and the application of this discipline expertise to current and future technology requirements. Longer range studies are directed at defining the technology requirements for future space systems and missions, including technology developement for a space station with a future potential of being permanently manned.

The objective in the materials area is to establish and demonstrate the required technology for application of advanced materials for a wide variety of space applications. Materials systems and applications include: high temperature composites with long-life capability for use as structural materials in future space transportation systems; high temperature metallic materials for thermal protection systems; and high-stiffness, low weight, low thermal expansion composites for large, long-life space structures. Environmental effects on the mechanical and physical properties of materials are being studied utilizing specialized facilities and laboratories. These studies include dimensional stability and radiation stability of composites and thermal control coatings. An integral part of the research activity is the definition of new experimental testing and research facility requirements which will assure that the reliability and durability of future space structures can be adequately predicted and assessed.

The goal of the activities in the area of structures is to provide validated analysis and design methodology, design concepts, and dynamics and control methodology required for efficient long-life space transportation and payload structures. High temperature metallic heat shield concepts and actively cooled structural and propulsion concepts for advanced space transportation systems are being derived and evaluated using specialized laboratories and wind tunnels. Analysis, design, and loads determination methodology for deployable and erectable large space platforms, antennas, and booms are being studied as part of a multi-Center, multidisciplinary program for advanced technology. An integrated structural-thermal analysis methodology is being developed and verified for spacecraft structures. Work will be initiated on integral controls software that will require application of advanced numerical techniques and computer hardware.

An extensive program in electronic component technology, automation/intelligent systems technology, and information systems technology is conducted at LaRC. Sensor research includes laser backscatter, continuously tunable infrared laser techniques, and high-powerhigh-pressure tunable gas lasers for the measurement of low concentration atmospheric constituents. In 1984, LaRC will evaluate data from a Laser Heterodyne Spectrometer aircraft instrument flight to measure stratospheric constituents in the 9-12um region, and will continue evaluation of an array of microwave radiometer receivers for high-resolution (± 1 km) oceanographic sensing. Evaluation of a candidate information adaptive system will be carried out in 1984. The broad objective of this work is to develop an onboard processor technology base for remote sensing vehicles with the potential of leading to a 1,000-fold decrease in the density of data sent back to Earth processing stations. The evaluation of a solid-state data storage system using bubble domain technology is underway at LaRC. The overall objective is to provide an adequate bit, solid-state data storage system suitable for replacing tape recorders in many aerospace vehicle applications. Automation technology efforts will focus on remote satellite servicing concepts and requirements. Other space electronics technology efforts are focused on spacecraft attitude control (using momentum storage or vernier pointing devices); software development, verification, and validation techniques; and special problems in large space structures pointing and figure control.

The objective of the LaRC entry technology program is to develop experimental and theoretical data bases to support: development of Space Transportation System (STS) vehicles for the 1990's and beyond, employing technologies advanced beyond those utilized for the Space Shuttle; performance of the evolving STS program and solving operational problems as they surface; and reduction and interpretation of STS flight data. The objectives are being met through the development and application of experimental and theoretical techniques employing LaRC computers and wind tunnel facilities and through comparative analyses of the resulting data with flight data, as available.

Disciplines include aerodynamic/thermodynamic performance, configuration optimization, flight control system assessment, mission design, planetary entry trajectory analyses, and computional flow-field techniques.

The Space Shuttle orbiter will be utilized as a research vehicle to extend the knowledge of aerodynamics, aerothermodynamics, and basic fluid mechanics into previously inaccessible flow regimes by acquiring flight measurements during routine Space Shuttle operations. Experiments are being developed for Space Shuttle flights which will provide unique measurements for direct assessment of ground-based facility measurements and theoretical techniques. The Space Shuttle will also be utilized as a space platform to perform LaRC-developed payload experiments extending basic research and technology development into the space enviroment when economically feasible or when the development can be achieved only in space.

The LaRC program in space energy conversion has two primary foci: advanced radiant energy conversion and advanced photovoltaic energy conversion concepts. The objective of the energy conversion effort is to perform basic research on nuclear- and solar-pumped lasers for conversion of nuclear and solar energy directly into electromagnetic radiation, laser power, or work for potential power generation, transmission, and storage for future space missions. The objective of the photovoltaic energy conversion research is to develop new energy conversion technology to improve the conversion efficiency, reduce mass and cost, and increase the operating life of energy conversion elements in the space environment. Indications are that these new solar cells offer the potential of significantly outperforming currently available silicon solar cells; therefore, this effort can lead to a more reliable, economical, refined space power system.

	Permanent Positions (Civil Service)
CENTER MANAGEMENT AND OPERATIONS SUPPORT..	673

Center management and operations support provides services or support to all LaRC organizations which cannot be identified exclusively to a single program or project. The civil service personnel involved are:

Director and Staff - The Center Director, Deputy Director, and immediate staff; e.g., Chief Scientist, Equal Opportunity, and Public Affairs.

Management Support - The LaRC civil service personnel who provide information and control services supporting all levels of Center management, both program and functional. Specific functions include resources and financial management, program control, contracting and procurement, property management, personnel management, and management systems and analysis.

Operations Support - The LaRC civil service personnel who provide for the operation and maintenance of institutional facilities, buildings, systems, and equipment, including those who manage or provide technical services such as automatic data processing, reliability and quality assurance, medical care, and photographic support.

RESOURCES REQUIREMENTS BY FUNCTION

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of Dollars)		
I. PERSONNEL AND RELATED COSTS	101,234	100,654	107,436	108,351

Summary of Fund Requirements

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
A. Compensation and Benefits				
1. Compensation				
a. Permanent positions....................	88,893	88,054	92,550	92,737
b. Other than full-time permanent positions	1,638	1,583	1,596	1,686
c. Overtime and other compensation.......	863	984	1,011	1,027
Subtotal, Compensation.................	91,394	90,621	95,157	95,450
2. Benefits................................	9,243	9,291	11,564	12,091
Subtotal, Compensation and Benefits.. .	100,637	99,912	106,721	107,541
B. Supporting Costs				
1. Transfer of personnel.....................	43	160	140	175
2. Personnel training........................	554	582	575	635
Subtotal, Supporting Costs..	597	742	715	810
Total, Personnel and Related Costs.......	101,234	100,654	107,436	108,351

Explanation of Fund Requirements

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of Dollars)		
A. Compensation and Benefits..................	100,637	99,912	106,721	107,541
1. Compensation	91,394	90,621	95,157	95,450
a. Permanent positions	88,893	88,054	92,550	92,737

The current estimate for 1983 reflects a change from the 1983 budget estimate due to the recent pay increases.

Basis of Cost for Permanent Positions

In 1984, the cost of permanent positions will be $92,737,000. The increase results from the following:

Cost of permanent positions in 1983..		92,550
Cost increases in 1984..		+2,164
Within grade and career development advances:		
Full year effect of 1983 actions..............................	+913	
Partial year effect of 1984 actions............................	+1,132	
Full year effect of 1983 pay increase...........................	+119	
Cost decreases in 1984..		-1,977
Turnover savings:		
Full year effect of 1983 actions..............................	-163	
Partial year effect of 1984 actions............................	-1,167	
One less paid day in 1984...	-345	
Alteration in the method of calculation of salaries paid (PL 97-253)..	-302	
Cost of permanent positions in 1984..		92,737

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of Dollars)		
b. Other than full-time permanent positions				
1. cost	1,638	1,583	1,596	1,686
2. Workyears	142	142	143	144

The distribution of 1984 workyears is as follows:

Distribution of Other Than Full-Time Permanent Workyears

Program	Workyears
Developmental programs	85
Summer employment program	10
Youth opportunity programs	35
Other temporary	14
Total	144

The increase from the 1983 budget estimate to the 1983 current estimate is due to a reinstatement of a previously reduced summer employment program, as well as the 1982 pay increase. The 1984 estimate reflects a level of effort comparable to 1983.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
c. Overtime and other compensation	863	984	1,011	1,027

Overtime and other compensation includes overtime, holiday pay, and incentive awards. The use of overtime and other compensation is limited to emergency repairs and work that cannot be accomplished during normal working hours. This includes the monitoring of on-site contracts being performed during off-duty hours and wind tunnel work required at night to take advantage of off-peak electrical rates. The increase from the 1983 budget estimate to the 1983 current estimate reflects the effect of the 1982 pay increases. The 1984 estimate represents a continuation of the 1983 level of effort.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
	(Thousands of Dollars)			
2. Benefits............................	9,243	9,291	11,564	12,091

The following are the amounts of contribution by category:

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
Civil Service Retirement Fund...........	6,254	6,003	6,614	6,797
Employee life insurance..	253	269	271	279
Employee health insurance.......	2,011	1,894	2,623	2,805
Workmen's compensation	658	1,075	1,075	1,075
FICA....................................	29	35	27	27
Medicare................................	---	---	939	1,091
Other benefits..........................	38	15	15	17
Total................................	9,243	9,291	11,564	12,091

The increase from the 1983 budget estimate to the 1983 current estimate is primarily due to the October 1982 pay increase. In addition, there is a rise in the cost of Government health insurance and the new requirement for Government employees contributions to the Medicare program. The 1984 estimate reflects essentially the same level as 1983.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
B. Supporting Costs............................	597	742	715	810
1. Transfer of personnel	43	160	140	175

Transfer of personnel includes actual expenses involved in the movement and temporary storage of employees' household goods, subsistence and temporary expenses, real estate costs, and miscellaneous moving expenses. The decrease from the 1983 budget estimate to the 1983 current estimate reflects the planned level and kind of hires to be made in 1983. The 1984 estimate reflects the same level of activity as 1983.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of Dollars)		
2. Personnel training	554	582	575	635

The purpose of the training program is to continue the development and education of civil service employees to support LaRC's roles and missions more efficiently. The 1984 estimate is essentially level with 1983 at expected 1984 tuition rates.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
II. TRAVEL	1,984	2,536	2,185	2,325

Summary of Fund Requirements

A. Program Travel.............................	1,434	1,919	1,549	1,615
B. Scientific and Technical Development Travel	383	385	428	479
C. Management and Operations Travel...........	167	232	208	231
Total, Travel............................	1,984	2,536	2,185	2,325

Explanation of Fund Requirements

A. Program Travel.............................	1,434	1,919	1,549	1,615

Program travel is directly related to the accomplishment of the Center's mission. Travel for program purposes reflects the continuing effort in space research, aircraft technology, flight simulation, fluid machanics, airborne science and applications, space applications, and Shuttle support. The decrease from the 1983 budget to the 1983 current estimate reflects a decreased level of travel based on 1982 experience. The 1984 estimate reflects essentially the same level of travel as 1983.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
	(Thousands of Dollars)			
B. Scientific and Technical Development Travel	383	385	428	479

Scientific and technical development travel permits employees to participate in meetings and technical seminars with other representatives of the aerospace community. This participation allows them to benefit from exposure to technological advances outside LaRC, as well as to present both accomplishments and problems to their associates. Many of the meetings are working panels convened to solve certain problems for the benefit of the Government. The increase from the 1983 budget estimate to the 1983 current estimate is a result of a reduction in airfare special rates and discounts previously available. The 1984 estimate essentially reflects the same level of travel as 1983.

C. Management and Operations Travel...........	167	232	208	231

Management and operations travel is used for the direction and coordination of general management matters. It includes travel in such areas as personnel, financial management, and procurement activities; travel of the Center's top management to NASA Headquarters and other NASA Centers; peer group reviews; and local transportation. The decrease between the 1983 budget estimate and the 1983 current estimate reflects a reduction in the number of trips. The 1984 estimate reflects about the same level of travel as 1983 at anticipated price levels.

III. OPERATION OF INSTALLATION.................	23,373	28,113	24,568	28,405

Summary of Fund Requirements

A. Facilities Services........................	12,696	17,498	14,039	16,256
B. Technical Services.........................	4,223	3,452	3,058	4,124
C. Management and Operations....................	6,454	7,163	7,471	8,025
Total, Operation of Installation..........	23,373	28,113	24,568	28,405

Explanation of Fund Requirements

Operation of Installation provides a broad range of services, supplies, and equipment in support of the Center's institutional activities. These are divided into three major functional areas: Facilities Services, the cost of maintaining and repairing institutional facilities and equipment, and the cost of custodial services and utilities; Technical Services, the cost of automatic data processing for management activities, and the cost of educational and informational programs and technical shops supporting institutional activities; and Management and Operations, the cost of administrative communications, reproduction, printing, transportation, medical, supply, and related services.

The difference in the 1983 current estimate from the 1983 budget estimate is the result of a rate and consumption decrease in electricity and fuel oil, coupled with a slight increase in the level of support contracts. The 1984 budget estimate provides for utility rate increases, along with increases in electrical consumption, plus adjustments in support contractor rates, and supplies, materials, and equipment costs.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of Dollars)		
A. FACILITIES SERVICES........................	12,696	17,498	14,039	16,256

LaRC is located on 807 acres of grounds in a complex made up of laboratory and office type buildings, as well as research wind tunnels. This complex encompasses 2,068,679 gross square feet of building space. Included are 19 major technical facilities. This physical plant houses an average daily on-Center population of 4,100 to 4,400 personnel. Many of the best facilities are utilized on more than one shift or during off-peak hours.

Summary of Fund Requirements

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
	(Thousands of Dollars)			
1. Rental of Real Property	---	1	---	---
2. Maintenance and Related Services	443	775	526	557
3. Custodial Services	3,091	2,767	1,920	2,877
4. Utility Services	9,162	13,955	11,593	12,822
Total, Facilities Services	12,696	17,498	14,039	16,256

Explanation of Fund Requirements

1. Rental of Real Property	---	1	---	---

The amount provided in the 1983 budget estimate covers the cost of leasing rights of way for access to model drop zone areas.

2. Maintenance and Related Services	443	775	526	557

This estimate provides funds for maintenance and repair of administrative facilities, roads and utility lines, and grounds maintenance. The decrease in the 1983 current estimate from the 1983 budget estimate reflects 1982 experience and a rephasing of contractor funding plans. The 1984 estimate provides for the same level of effort at anticipated price levels.

3. Custodial Services	3,091	2,767	1,920	2,877

This activity provides for janitorial and security services. Also included are funds for fire protection services provided by the City of Hampton. The decrease from the 1983 budget estimate to the 1983 current estimate is due to a rephasing of contractor plans. The 1984 estimate provides for the same level of effort at anticipated price levels and a full year of funding for support service contracts.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
	(Thousands of Dollars)			
4. Utility Services........................	9,162	13,955	11,593	12,822

Included in this item is the purchase of electric service from Virginia Electric and Power Company, fuel oil from a local supplier, and water and sewage charges. **Also** included are funds for heat and steam services from the Air Force for East Area facilities and the purchase of steam from the city of Hampton for facilities located in the West Area of LaRC. The decrease from the **1983** budget estimate to the **1983** current estimate is the result of current consumption and rate assumptions. The **1984** budget estimate reflects anticipated utility cost rates with consumption expected to be level.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
B. TECHNICAL SERVICES..........................	4,223	3,452	3,058	4,124

Summary of Fund Requirements

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
1. Automatic Data Processing	3,199	2,675	2,307	3,323
a. Equipment	488	230	587	624
b. Operations	2,711	2,445	1,720	2,699
2. Scientific and Technical Information....	1,024	777	751	801
a. Library	193	217	208	228
b. Education and Information..	831	560	543	573
Total, Technical Services.........	4,223	3,452	3,058	4,124

Explanation of Fund Requirements

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of Dollars)		
1. Automatic Data Processing	3,199	2,675	2,307	3,323

Funds for the Center's business computer complex which provides the accounting and management information data required by the Center and NASA are provided in this function. Included are equipment lease, purchase and maintenance; paper and other expendable supplies; a contract for programming and operations; and several small contracts. The decrease from the 1983 budget estimate to the 1983 current estimate is due to a rephasing of contractor funding plans. The 1984 estimate provides for the same level of effort at anticipated contractor rate levels and a full year of funding for support service contracts.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
2. Scientific and Technical Information....	1,024	777	751	801

This estimate provides support service contract assistance in the operation of the technical library and the Visitor Information Center. Funding for all the Center's public affairs activities is included in these estimates. Also included is support for operation of the Visitor Information Center; coordination of tours and special events; construction and transportation of exhibits; and other miscellaneous educational information programs. The decrease from the 1983 budget estimate to the 1983 current estimate reflects a decreased level of support service contract support. The 1984 estimate provides for the same level of effort at anticipated contractor rate levels.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
	(Thousands of Dollars)			
C. MANAGEMENT AND OPERATIONS..................	6,454	7,163	7,471	8,025

Summary of Fund Requirements

1. Administrative Communications.	1,372	1,448	1,896	2,017
2. Printing and Reproduction	72	156	151	173
3. Transportation	1,997	2,178	2,097	2,364
4. Installation Common Services...........	3,013	3,381	3,327	3,471
Total, Management and Operations	6,454	7,163	7,471	8,025

Explanation of Fund Requirements

1. Administrative Communications..........	1,372	1,448	1,896	2,017

This estimate includes funds for local telephone and exchange costs; Federal Telecommunications Systems (FTS) services; and datafax and telegraphic service. The increase in the 1983 current estimate from the 1983 budget estimate reflects adjustments for rate increases in FTS and local service not provided for in the 1983 budget. The 1984 estimate provides for the continuation of the 1983 level of service with anticipated rate increases.

2. Printing and Reproduction	72	156	151	173

This estimate provides for special supplies for reproduction services. The 1984 estimate reflects the same level of service as 1983.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of Dollars)		
3. Transportation	1,997	2,178	2,097	2,364

This activity includes the operation, maintenance, and purchase of motor vehicles, as well as shipping, transportation and freight charges. Also included are charges for local transportation; pickup and delivery of freight, furniture, and other bulk objects; and operation and maintenance of the administrative aircraft. This effort also includes all of the aircraft fuel, equipment, and expendable supplies. The decrease in the 1983 current estimate from the 1983 budget estimate is due to a decrease in support contractor rates. The 1984 estimate provides for continuation of the 1983 level of effort at anticipated price levels, a full year of funding for support service contracts, and an increase in motor vehicle replacement.

4. Installation Common Services...........	3,013	3,381	3,327	3,471

These funds provide for medical service, mail delivery, stock issue and warehousing, and other general administrative support. Also included are the rental and maintenance of office copy machines and equipment, minority programs, and other administrative services and supplies. The decrease in the 1983 current estimate from the 1983 budget estimate reflects a minor decrease in support service contractor costs. The 1984 estimate reflects the same level of service as 1983.

LANGLEY H EIITER

qPM 7-25

DECEMBER 16, 1982

STAFFING SUMMARY

	83	84
SES	32	32
GS-15	150	150
GS-14	310	310
Other GS	2263	2263
Wage Grade	90	90
Total	2845	2845

OFFICE OF DIRECTOR

	83	84
SES	8	8
GS-15	0	0
GS-14	2	2
Other GS	25	25
Total	35	35

OFFICE OF DIRECTOR FOR PROJECTS

	83	84
SES	1	1
GS-15	1	1
GS-14	3	3
Other GS	2	2
Total	7	7

AERONAUTICS SYSTEMS OFFICE

	83	84
SES	1	1
GS-15	3	3
GS-14	8	8
Other GS	5	5
Total	17	17

SCOUT PROJECT OFFICE

	83	84
GS-15	1	1
GS-14	6	6
Other GS	12	12
Total	19	19

LDEF PROJECT OFFICE

	83	84
GS-15	3	3
GS-14	2	2
Other GS	3	3
Total	8	8

ACEE PROJECT OFFICE

	83	84
GS-14	1	1
Other GS	3	3
Total	4	4

SPACE TECH FLIGHT EXPERIMENTS OFFICE

	83	84
GS-15	1	1
GS-14	3	3
Other GS	6	6
Total	10	10

ERBE/SAGE II/HALOE PROJECT OFFICE

	83	84
GS-15	2	2
GS-14	1	1
Other GS	3	3
Total	6	6

OFFICE OF DIRECTOR FOR ELECTRONICS

	83	84
SES	1	1
GS-14	1	1
Other GS	2	2
Total	4	4

ANALYSIS AND COMPUTATION DIVISION

	83	84
SES	1	1
GS-15	5	5
GS-14	13	13
Other GS	93	93
Total	112	112

INSTRUMENT RESEARCH DIVISION

	83	84
SES	1	1
GS-15	5	5
GS-14	15	15
Other GS	114	114
Total	135	135

FLIGHT DYNAMICS AND CONTROL DIVISION

	83	84
SES	1	1
GS-15	6	6
GS-14	7	7
Other GS	35	35
Total	49	49

FLIGHT ELECTRONICS DIVISION

	83	84
SES	1	1
GS-15	6	6
GS-14	21	21
Other GS	101	101
Total	129	129

FLIGHT CONTROL SYSTEMS DIVISION

	83	84
SES	1	1
GS-15	6	6
GS-14	20	20
Other GS	79	79
Total	106	106

OFFICE OF DIRECTOR FOR STRUCTURES

	83	84
SES	1	1
GS-14	1	1
Other GS	2	2
Total	4	4

ACOUSTICS AND NOISE REDUCTION DIVISION

	83	84
SES	1	1
GS-15	6	6
GS-14	8	8
Other GS	37	37
Total	52	52

STRUCTURES AND DYNAMICS DIVISION

	83	84
SES	1	1
GS-15	10	10
GS-14	11	11
Other GS	43	43
Total	65	65

MATERIALS DIVISION

	83	84
SES	1	1
GS-15	8	8
GS-14	13	13
Other GS	47	47
Total	69	69

LOADS & AEROELASTICITY DIVISION

	83	84
SES	1	1
GS-15	5	5
GS-14	16	16
Other GS	48	48
Total	70	70

OFFICE OF DIRECTOR FOR AERONAUTICS

	83	84
SES	1	1
GS-15	1	1
GS-14	1	1
Other GS	2	2
Total	5	5

LOW-SPEED AERODYNAMICS DIVISION

	83	84
SES	1	1
GS-15	9	9
GS-14	9	9
Other GS	75	75
Wage Grade	7	7
Total	101	101

HIGH-SPEED AERODYNAMICS DIVISION

	83	84
SES	1	1
GS-15	12	12
GS-14	15	15
Other GS	68	68
Total	96	96

TRANSONIC AERODYNAMICS DIVISION

	83	84
SES	1	1
GS-15	6	6
GS-14	18	18
Other GS	84	84
Total	109	109

OFFICE OF DIRECTOR FOR SPACE

	83	84
SES	1	1
GS-15	1	1
GS-14	1	1
Other GS	2	2
Total	5	5

ATMOSPHERIC SCIENCES DIVISION

	83	84
SES	1	1
GS-15	15	15
GS-14	26	26
Other GS	56	56
Total	98	98

SPACE SYSTEMS DIVISION

	83	84
SES	1	1
GS-15	9	9
GS-14	25	25
Other GS	66	66
Total	101	101

OFFICE OF DIRECTOR FOR SYSTEMS ENGINEERING AND OPERATIONS

	83	84
SES	2	2
GS-15	2	2
GS-14	5	5
Other GS	12	12
Total	21	21

FABRICATION DIVISION

	83	84
GS-15	2	2
GS-14	3	3
Other GS	304	304
Wage Grade	6	6
Total	315	315

SYSTEMS ENGINEERING DIVISION

	83	84
SES	1	1
GS-15	8	8
GS-14	13	13
Other GS	110	110
Total	132	132

FACILITIES ENGINEERING DIVISION

	83	84
GS-15	5	5
GS-14	17	17
Other GS	115	115
Total	137	137

OPERATIONS SUPPORT DIVISION

	83	84
GS-15	1	1
GS-14	4	4
Other GS	345	345
Wage Grade	64	64
Total	414	414

SYSTEMS SAFETY, QUALITY & RELIABILITY OFFICE

	83	84
GS-15	1	1
GS-14	2	2
Other GS	28	28
Total	31	31

RESEARCH INFORMATION AND APPLICATIONS DIVISION

	83	84
GS-15	1	1
GS-14	1	1
Other GS	71	71
Wage Grade	13	13
Total	86	86

OFFICE OF DIRECTOR FOR MANAGEMENT OPERATIONS

	83	84
SES	1	1
GS-15	4	4
GS-14	5	5
Other GS	9	9
Total	19	19

FINANCIAL MANAGEMENT DIVISION

	83	84
GS-15	1	1
GS-14	1	1
Other GS	49	49
Total	51	51

BUSINESS DATA SYSTEMS DIVISION

	83	84
GS-15	1	1
GS-14	1	1
Other GS	9	9
Total	11	11

PERSONNEL DIVISION

	83	84
GS-15	1	1
GS-14	4	4
Other GS	38	38
Total	43	43

MANAGEMENT SUPPORT DIVISION

	83	84
GS-14	1	1
Other GS	58	58
Total	59	59

ACQUISITION DIVISION

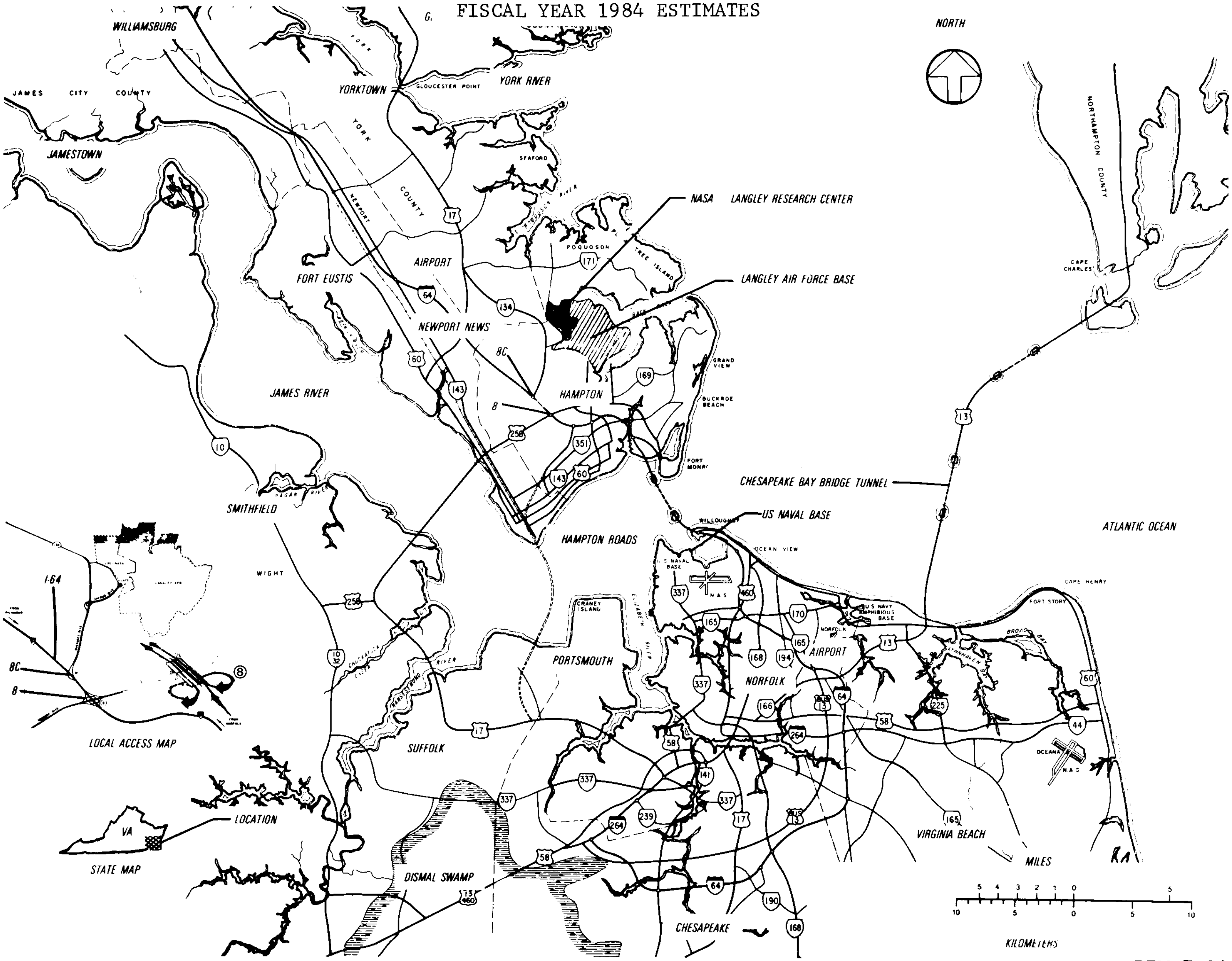
	83	84
GS-15	1	1
GS-14	4	4
Other GS	79	79
Total	84	84

PROGRAMS AND RESOURCES DIVISION

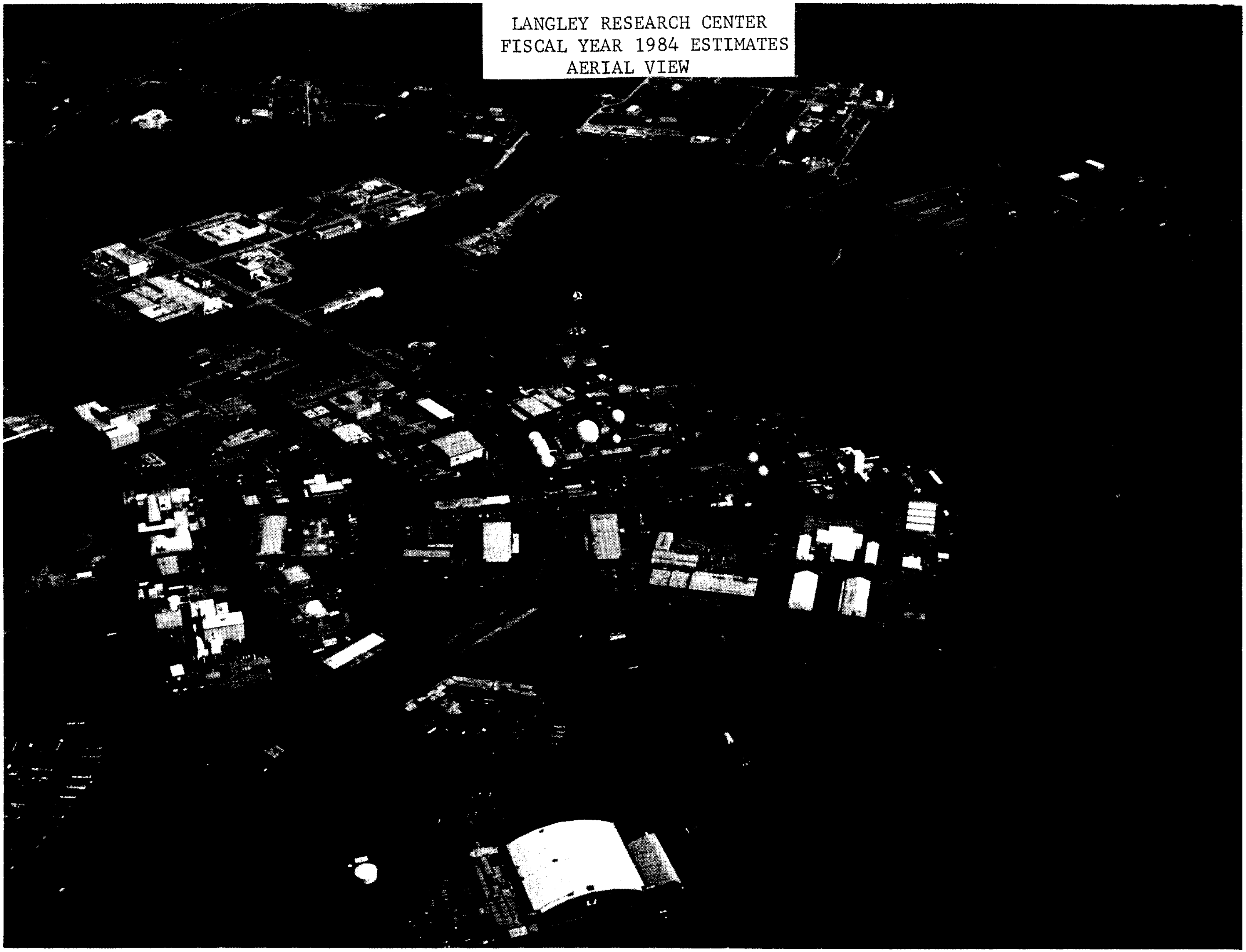
	83	84
GS-15	1	1
GS-14	3	3
Other GS	23	23
Total	27	27

LANGLEY RESEARCH CENTER

AND VICINITY



LANGLEY RESEARCH CENTER
FISCAL YEAR 1984 ESTIMATES
AERIAL VIEW



LEWIS
RESEARCH CENTER

RESEARCH AND PROGRAM MANAGEMENT

FISCAL YEAR 1984 ESTIMATES

LEWIS RESEARCH CENTER

DESCRIPTION

The Lewis Research Center (LeRC) occupies two sites in north central Ohio. The original site, established in 1941, adjacent to the Cleveland-Hopkins International Airport, includes 366 acres, 14 of which are leased from the City of Cleveland. There are over 170 buildings and structures, including wind tunnels, test chambers, laboratories and other research facilities at the Cleveland location.

The Plum Brook Station, established in 1956, is located south of Sandusky, Ohio, about 50 miles west of Cleveland, on land formerly occupied by the Plum Brook Ordnance works. There are 8,005 acres owned by NASA and approximately 47 acres in easements. There are 69 buildings and 99 concrete storage bunkers. A 100 kw wind turbine generator research facility is in operation for a program jointly sponsored by NASA and the U.S. Department of Energy. During 1975, consistent with future NASA research and technology needs, the principal facilities were placed in a standby mode. Since then a number of Federal, state and local government agencies have utilized office space and other facilities. The Garrett Corporation presently leases the Space Power Facility (SPF). The lease began on November 1, 1979, and covers a five-year period with three one-year extensions possible. The Garrett Corporation utilizes the SPF to manufacture gas centrifuges for the Department of Energy.

The total capital investment of LeRC and Plum Brook Station, including fixed assets in progress and contractor-held facilities at various locations, as of September 30, 1982, was $485,614,000.

CENTER ROLES AND MISSIONS

LeRC was established in 1941 as an aircraft engine research laboratory to develop superior aircraft propulsion systems. Since then, LeRC has developed and constructed many unique facilities for testing full-scale aircraft engines and engine components, chemical rocket engines, electric propulsion systems, space and terrestrial power generation systems, and space communication systems. The principal and supporting roles are:

PRINCIPAL

Aeronautics - develop and maintain a preeminent national capability in: fundamental aeropropulsion disciplines including internal computational fluid dynamics, internal unsteady aerodynamics and aeroelasticity, fuels and combustion chemistry and kinetics, hot section heat transfer, fluid mechanics and acoustics, aircraft icing phenomena, and computer science and applications; aeronautical propulsion and power technologies including engine materials and structures, tribology, bearings, seals, inlets, nozzles, propulsion system integration, compressors, turbines, transmissions, propellers, instrumentation and controls; and the associated research facilities and techniques.

Expendable Launch Vehicles - manage and operate of the Atlas/Centaur launch vehicle system for Government and commercial users.

Space Transportation System/Cryogenic Upper Stage - design, develop and manage the Centaur Cryogenic Upper Stage for the Space Transportation System to support the launch of Galileo, International Solar Polar and Air Force missions.

Space Propulsion Systems Technology - development and maintenance of the technology base for chemical and electric space propulsion systems, including associated structures and materials.

Space Energy Processes and Systems Technology - development and maintenance of the technology base for space power and energy conversion systems, including associated structures and materials.

Advanced Communications Systems Technology - development of advanced communications technology, including high-power microwave and millimeter wavelength components and systems oriented toward satellite-based applications, and initiation of design and development efforts on the Advanced Communications Technology Satellite project.

SUPPORTING

Expendable Launch Vehicles - procurement of Atlas boosters for the Air Force.

Energy Processes and Systems Technology - management of research and technology projects for terrestrial applications of energy production, conservation and storage systems.

SUMMARY OF RESOURCES REQUIREMENTS

Funding Plan by Function

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
	(Thousands of Dollars)			
I. Personnel and Related Costs......................	88,678	89,086	94,764	98,009
II. Travel...	1,364	1,545	1,757	2,086
111. Operation of Installation.......................	16,370	19,960	19,399	21,762
A. Facilities Services.........................	(13,759)	(16,307)	(16,506)	(18,378)
B. Technical Services..........................	(654)	(627)	(602)	(777)
C. Management and Operations....................	(1,957)	(3,026)	(2,291)	(2,607)
Total, fund requirements..	106,412	110,591	115,920	121,857

Distribution of Permanent Positions by Program

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
Direct Positions				
Space Transportation System	119	141	130	160
Space transportation capability development	26	---	85	115
Space transportation operations	93	141	45	45
Space Science and Applications	71	57	93	129
Space applications	71	57	93	129
Technology Utilization	1	---	1	1
Aeronautics and Space Technology	1,836	1,663	1,657	1,591
Aeronautical research and technology	1,299	1,283	1,255	1,219
Space research and technology	360	380	362	372
Energy technology	177	---	40	---
Subtotal, direct positions	2,027	1,861	1,881	1,881
Center Management and Operations Support	636	618	598	598
Total, permanent positions	2,663	2,479	2,479	2,479

PROGRAM DESCRIPTION

	Permanent Positions (Civil Service)
SPACE TRANSPORTATION CAPABILITY DEVELOPMENT....................................	115

This program provides launch vehicles and launch operations for automated space missions. The program includes the procurement of vehicle systems hardware, launch services, and engineering and management support, as well as maintenance and operation of ground support equipment. In 1984, civil service personnel working on the Atlas/Centaur launch vehicle program will continue to support the Intelsat V-A and FLTSATCOM programs. In addition, Atlas vehicles are being procured by LeRC to support Department of Defense missions.

SPACE TRANSPORTATION OPERATIONS..	45

Design and development of the Cryogenic Upper Stage (Centaur-G) for NASA and USAF use are managed by LeRC through the Space Shuttle/Centaur Joint Project Office. In 1984, civil service personnel will support the activities required to integrate the Centaur-G into the space transportation system. Major milestones include delivery of structural test articles, critical design reviews on the vehicle/structural support systems, and the beginning of the development test program. In addition, work will continue on those design and development tasks associated with the NASA-unique Centaur-G prime to be used for the Galileo and International Solar Polar missions.

SPACE APPLICATIONS..	129

Space applications activity at LeRC consists principally of space communications research. In 1984, civil service personnel will continue to support the studies of the capabilities and costs of various advanced satellite communications systems concepts directed at providing additional frequency bands and improved communications service. These studies are being focused on the needs of the public and private sectors, both nationally and internationally. LeRC has been developing technology with possible application to both the ground and space segments of future advanced civil and military communications systems.

In 1984, LeRC will initiate a major contract activity with U.S. industry to develop an Advanced Communications Technology Satellite (ACTS) incorporating many of the technologies developed in the proof-of-concept model technology development program. The initiation of this project assumes significant industry contribution to offset the cost of the ACTS. The objectives of the ACTS program are to develop and validate the technology required to enable growth in capacity and effective utilization of the frequency spectrum and to effect new and innovative uses for satellite communications. Launch of the ACTS is scheduled for **1988.**

LeRC accomplishes advanced design and development of scientific flight experiments in basic science and technology associated with combustion and fluid dynamics phenomenon in reduced gravity.

	Permanent Positions (Civil Service)
TECHNOLOGY UTILIZATION..	**1**

The technology utilization program will continue to identify, evaluate, and publish selected technology documents and promote biomedical and commercial projects.

AERONAUTICAL RESEARCH AND TECHNOLOGY..	1,219

LeRC's major research and technology responsibility in aeronautics is propulsion. The primary goal is to provide the technology base for developing advanced civil and military aeronautical propulsion systems which will lead to improvements in fuel efficiency, operating cost, reliability and durability, and which will operate with acceptable environmental impact. In **1984,** civil service personnel will be involved in conducting the program described below.

In aeronautical propulsion-related research, the goal is to develop an understanding of the physical phenomena related to propulsion systems and components including: structural dynamics and aeroelasticity, computational fluid mechanics, fatigue and fracture of materials, fuel chemistry and physical characterization, combustion processes and heat transfer, low- and high-temperature composite materials, noise generation mechanisms, and advanced control theories and concepts.

The major goal in component research is to advance the state of the art in engine component technology including the following areas: highly loaded compressor stages, advanced turbine cooling, blade tip clearance control, advanced transmissions, fuel-flexible combustors, two-dimensional nozzles, supersonic inlets, high- and low-speed propellers, bearings, seals, and instrumentation.

In engine systems research, LeRC is studying the problems encountered in complete engines and propulsion systems, including engine performance at altitude, inlet flow distortion effects, dynamic component interactions including stall recovery, thrust augmentation, advanced control systems, icing research associated with propulsion systems, and small engine technology.

An extensive effort in materials and structures research supports the aeronautics propulsion program. The scope of this program involves both metallic and nonmetallic materials, including ceramics and ceramic composites, and their application to advanced aircraft engines. Areas of emphasis include the development of alloys and matrix composites capable of higher operating temperatures with longer operating lifetimes, lower fabrication costs, and reduced strategic material content. The fatigue and fracture behavior of alloys under realistic operating conditions and the development of operating life prediction techniques are integral portions of this materials development effort.

	Permanent Positions (Civil Service)
SPACE RESEARCH AND TECHNOLOGY...................................	372

The major roles of LeRC in space research and technology are to advance the state of the art and maintain a technology base for advanced propulsion and power systems, including associated materials and structures work and space power processing, as well as technology development for a space station with a future potential of being permanently manned. In 1984, civil service personnel will be used in the activities described below:

The LeRC chemical propulsion programs emphasize the extension of the technologies of existing hydrogen- or hydrocarbon-fueled engines toward long-life, reusable, serviceable high-performance engine systems for Earth-to-orbit applications. The effort concentrates on thrust chamber cooling and life enhancement, critical turbomachinery components such as bearings, seals, improved materials, and maintenance diagnostics. Another thrust is to provide the technology for improving orbital transfer propulsion systems in the areas of versatility, performance, life and reusability. Both high- and low-thrust systems will be investigated with emphasis on combustion and heat transfer, long-life lightweight reusable components, and high expansion area nozzles. To support this orbital propulsion work, there will be an effort in cryogenic propellant management under reduced gravity. Effort on space auxiliary propulsion systems will concentrate on the technology for gaseous propulsion systems and their special requirements.

The LeRC electric propulsion programs are directed toward both primary and auxiliary applications. Electrostatic propulsion is concerned with advanced thruster performance, controls and power processing. Its applications are primarily aimed at performance-driven missions such as geosynchronous satellites and planetary missions. Electrothermal concepts are investigated to understand basic physical processes and to establish the feasibility of specific approaches. Performance and potential use in auxiliary propulsion systems for large low-Earth-orbit missions will be analyzed and exploited. The particular advantage of multi-fuel use and the synergistic benefits to mission planning will be assessed. Electromagnetic propulsion concepts are evaluated for feasibility and enabling technology requirements, and efforts are directed toward providing the needed technology.

LeRC does basic science and technology work in combustion and fluid dynamics in reduced gravity. This defines and accomplishes the conceptual design for science experiments among the scientific community in universities, industry, and government.

Space power generation studies include solar photovoltaic, electrochemical energy conversion and power circuit development. The photovoltaic program is directed toward an improvement in solar cell efficiency, reduced cost and improved operating life. Electrochemical research and development supports extended operating life and improved energy density for space batteries and fuel cell components and systems.

Power circuit technology development is needed for management of multihundred kw power systems on space vehicles of the future, and new modes of power generation and conversion are being investigated. The interactions of the space plasma environment with high-voltage power systems and components are also being studied, and technology is being developed to control these interactions and prevent power system failures.

The space communications program includes applied research and advanced development in microwave electron beam amplifiers, microwave solid-state devices, and antenna systems. The program consists of efforts to develop advanced concepts, techniques, and communications systems components which will enable growth in the utilization of the radio frequency spectrum to frequencies well beyond 100GHz.

The LeRC program in space materials technology emphasizes the development of improved materials for advanced space power generation, propulsion and communications systems. Studies include space environmental effects on superalloys and composites, and lubrication problems in mechanical components.

	Permanent Positions (Civil Service)
CENTER MANAGEMENT AND OPERATIONS SUPPORT..	598

Center Management and Operations Support is defined as support or services being provided to all LeRC organizations which cannot be directly identified to a benefitting program or project. The civil service personnel involved are:

Director and Staff - The Center Director, Deputy Director, and immediate staff, e.g., Technology Utilization, Equal Opportunity, and Public Affairs.

Management Support - The part of the LeRC civil service workforce who provide information and control services supporting all levels of Center program and functional management. Specific functions include resources planning and management, legal and patent counsel, contracting and procurement, personnel management, property management, financial management, and management information systems and analysis.

Operations Support - The part of the LeRC civil service workforce who provide for the operation and maintenance of institutional facilities, buildings, systems, and equipment, including those who manage or provide technical services such as general automatic data processing, reliability and quality assurance, medical care, and graphics support.

RESOURCE REQUIREMENTS BY FUNCTION

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
	(Thousands of Dollars)			
I. PERSONNEL AND RELATED COSTS........................	88,678	89,086	94,764	98,009

Summary of Fund Requirements

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
A. Compensation and Benefits				
1. Compensation				
a. Permanent positions........................	76,571	76,314	80,304	82,325
b. Other than full-time permanent positions..	2,079	1,955	2,075	2,232
c. Overtime and other compensation...........	1,196	1,068	1,411	1,430
Subtotal, Compensation....................	79,846	79,337	83,790	85,987
2. Benefits....................................	8,259	9,079	10,317	11,297
Subtotal, Compensation and Benefits.......	88,105	88,416	94,107	97,284
B. Supporting Costs				
1. Transfer of personnel............	27	20	22	50
2. Personnel training...........................	546	650	635	675
Subtotal, Supporting Costs................	573	670	657	725
Total, Personnel and Related Costs............	88,678	89,086	94,764	98,009

Explanation of Fund Requirements

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of Dollars)		
A. Compensation and Benefits........................	88,105	88,416	94,107	97,284
1. Compensation..................................	79,846	79,337	83,790	85,987
a. Permanent positions......................	76,571	76,314	80,304	82,325

The current estimate for 1983 reflects a change from the 1983 budget estimate due to the recent pay increase.

Basis of Cost for Permanent Positions

In 1984, the cost of permanent positions will be $82,325,000. The increase from the 1983 level results from the following:

Cost of permanent positions in 1983..		80,304
Cost of increases in 1984..		+3,643
Within grade and career development advances:		
Full year effect of 1983 actions......................................	+680	
Partial year effect of 1984 actions..................................	+680	
Full year effect of 1983 pay increases..................................	+837	
Effect of 1984 decrease in offsetting reimbursable.......................	+1,446	
Cost decreases in 1984..		-1,622
Turnover savings:		
Full year effect of 1983 actions.......................................	-754	
Partial year effect of 1984 actions..................................	-275	
One less paid day in 1984..	-316	
Alteration in the method of calculation of salaries paid (P.L. 97-253)....	-277	
Cost of permanent positions in 1984..		82,325

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of Dollars)		
b. Other than full-time permanent positions				
1. Cost	2,079	1,955	2,075	2,232
2. Workyears	165	182	175	175

The distribution of 1984 workyears is as follows:

Distribution of Other Than Full-Time Permanent Workyears

Program	Workyears
Development programs	73
Summer employment program	14
Youth opportunity programs	22
Other temporary	66
Total	175

The increase from the 1983 budget estimate to the 1983 current estimate is due to the effect of the 1982 pay increases. The increase in the 1984 budget estimate reflects skill mix changes resulting in increased costs.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
c. Overtime and other compensation	1,196	1,068	1,411	1,430

The increase from the 1983 budget estimate to 1983 current estimate reflects a revised overtime plan consistent with the facility use schedule and 1982 pay increases. The 1984 estimate is essentially level with 1983.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of Dollars)		
2. Benefits	8,259	9,079	10,317	11,297

The following are the amounts of contribution by category:

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
Civil Service Retirement Fund	5,484	5,096	6,238	6,245
Employee life insurance	210	254	241	253
Employee health insurance	1,983	1,770	2,423	2,828
Workmen's compensation	452	1,164	490	878
FICA	87	45	90	90
Medicare	---	---	829	993
Other benefits	43	750	6	10
Total	8,259	9,079	10,317	11,297

The increase from the 1983 budget estimate to the 1983 current estimate is primarily due to the October 1982 pay increase and increases in the Government's share of Medicare payments and health insurance contribution. The workmen's compensation estimates for 1983 reflect estimates based on Department of Labor billings. The decrease in other benefits from the 1983 budget estimate to the 1983 current estimate is due to severance pay for a reduction-in-force not materializing because of a Center early out retirement granted by OPM.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
B. Supporting Costs	573	670	657	725
1. Transfer of personnel	27	20	22	50

The 1984 budget estimate reflects a revised number of relocations at estimated cost rates.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
2. Personnel training	546	650	635	675

The purpose of the training program is to continue the development of the skills and education of the civil service employees to support LeRC roles and missions more efficiently. The increase in the 1984 budget estimate from the 1983 current estimate reflects planned training at estimated costs.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of Dollars)		
II. TRAVEL.....................................	1,364	1,545	1,757	2,086

Summary of Fund Requirements

A. Program Travel..............................	988	1,266	1,405	1,698
B. Scientific and Technical Development Travel..	185	160	212	234
C. Management and Operations Travel............	191	119	140	154
Total, Travel.............................	1,364	1,545	1,757	2,086

Explanation of Fund Requirements

A. Program Travel..................................	988	1,266	1,405	1,698

Program travel is directly related to the accomplishment of the Center's mission and accounts for approximately 80% of travel costs. It provides funds necessary to manage major contractual programs in aeronautical research and technology, space propulsion, materials research and development and space energy processes and systems technology. Program travel is also essential to the management and procurement of launch vehicles. The 1983 current estimate and the 1984 budget estimate provides for an increase in travel due to the Space Transportation System/Centaur Development program.

B. Scientific and Technical Development Travel..	185	160	212	234

Scientific and technical development travel permits employees to participate in meetings and seminars with other representatives of the aerospace community. This participation allows them to benefit from exposure to technological advances outside LeRC, as well as to present both accomplishments and problems to their associates. Many of the meetings are working panels convened to solve problems for the benefit of the Government. The increase in the 1983 current estimate from the

1983 budget estimate reflects primarily the increased travel costs to domestic and foreign technical seminars as well as an increase in travel requirements. The 1984 estimate provides for anticipated cost increases at a decreased level of travel.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
	(Thousands of Dollars)			
C. Management and Operations Travel.................	191	119	140	154

Management and operations travel is required for the direction and coordination of general management matters. It includes travel in such areas as personnel, financial management, procurement, travel of the Center's top management to NASA Headquarters and other NASA Centers, and local transportation. The increase from the 1983 budget estimate to the 1983 current estimate reflects increased travel requirements associated with new management personnel at the Center and coordination efforts involving new programs and a Center reorganization. The 1984 estimate reflects a decreased level of travel offset by expected increases in travel costs.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
III. OPERATION OF INSTALLATION..	16,370	19,960	19,399	21,762

Summary of Fund Requirements

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
A. Facilities Services........................	13,759	16,307	16,506	18,378
B. Technical Services..........................	654	627	602	777
C. Management and Operations	1,957	3,026	2,291	2,607
Total, Operation of Installation..........	16,370	19,960	19,399	21,762

Explanation of Fund Requirements

Operation of Installation provides a broad range of services, supplies and equipment in support of the Center's institutional activities. These are divided into three major functional areas: Facilities Services, the cost of maintaining and repairing institutional facilities and equipment, and the cost of custodial services and utilities; Technical Services, the cost of automatic data processing for management activities and the cost of educational and informational programs and technical shops supporting institutional activities; and Management and Operations, the cost of administrative communications, reproduction, printing, transportation, medical, supply, and related services.

The decrease from the 1983 budget estimate to the 1983 current estimate is due to a decrease in utility consumption as well as a less than expected increase in utility rates. This decrease is partially offset by a slight increase in support service contractor effort primarily in the Facilities Services area. The 1984 estimate provides for increases in support contractor wage rates, utilities, communication rates, supplies, materials, equipment and minor contracts.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of Dollars)		
A. FACILITIES SERVICES	13,759	16,307	16,506	18,378
Summary of Fund Requirements				
1. Maintenance and Related Services	1,749	1,693	1,470	1,686
2. Custodial Services	2,960	3,178	3,086	3,526
3. Utility Services	9,050	11,436	11,950	13,166
Total, Facilities Services	13,759	16,307	16,506	18,378

Explanation of Fund Requirements

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of Dollars)		
1. Maintenance and Related Services.............	1,749	1,693	1,470	1,686

This activity provides for the operation and maintenance of facilities at the main installation in Cleveland and at the Plum Brook Station. Facilities maintenance includes buildings and grounds maintenance and maintenance of heating, ventilating, and air-conditioning systems and equipment. The decrease in the 1983 current estimate from the 1983 budget estimate reflects maintenance projects accelerated from 1983 to 1982 offset by a slight workyear increase in the grounds maintenance and facility engineering and construction contract coupled with support contractor rate increases. The increase in the 1984 estimate reflects the full year effect of the grounds maintenance and facility engineering and construction contracts at anticipated support contractor cost rates.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
2. Custodial Services...........................	2,960	3,178	3,086	3,526

Security and janitorial services are provided by support contractors. Other services include rubbish disposal, fly ash removal, and industrial cleaning of walls and lights on an as needed basis. The decrease from the 1983 budget estimate to the 1983 current estimate reflects a less than expected increase in support contractor rates offset by a slight workyear increase in the janitorial contract. The 1984 estimate provides for the continuation of janitorial services at the 1983 level with projected support contractor rate escalation and full year funding of support contracts.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
3. Utility Services.............................	9,050	11,436	11,950	13,166

Electrical power is provided by the local utility company. Natural gas is the primary heating fuel with oil as a backup fuel. A support contractor operates the central heating plant. The increase from the 1983 budget estimate to the 1983 current estimate is rate increases in utilities and support contractor areas offset by reductions in utilities consumption. The increase in 1984 is due to utility and support contractor rate increases.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of Dollars)		
B. TECHNICAL SERVICES................................	654	627	602	777

Summary of Fund Requirements

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
1. Automatic Data Processing	203	176	94	200
a. Equipment	65	24	94	200
b. Operations..	138	152	---	---
2. Scientific and Technical Information.........	451	451	508	577
Total, Technical Services..............	654	627	602	777

Explanation of Fund Requirements

1. Automatic Data Processing	203	176	94	200

Funding provides for administrative data processing, including maintenance and periodic replacement of equipment, and operations. The 1982 actual includes a one-time study of ADP support of the Center's management information systems. The increase in 1984 reflects lease rate cost increases, equipment replacement and update.

2. Scientific and Technical Information.........	451	451	508	577

Included in this activity is the support of the Center's educational programs and public information services. Funding for operation of the Visitor Information Center, conduct of tours and special events, construction and transport of special exhibits, and related activities are also included. The 1983 current estimate reflects the 1982 level of effort. The increase in 1984 is due to the full year cost of the 1983 level of effort at anticipated contractor wage rates.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
	(Thousands of Dollars)			
C. MANGEMENT AND OPERATIONS........................	1,957	3,026	2,291	2,607

Summary of Fund Requirements

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
1. Administrative Communications................	120	469	234	251
2. Printing and Reproduction	14	40	35	37
3. Transportation.	1,344	1,854	1,494	1,759
4. Installation Common Services.................	479	663	528	560
Total, Management and Operations	1,957	3,026	2,291	2,607

Explanation of Fund Requirements

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
1. Administrative Communications................	120	469	234	251

This estimate provides local and long distance telephone service and non-telephone communications. Local telephone service includes the leased lines and equipment to serve the Center population and is comprised of approximately 1,900 instruments, 950 stations and 50 incoming and outgoing lines. Non-telephone communications include telex, advanced record system teletype, rapidfax, datafax, teleconference equipment, oceanic cable service, and usage charges for airline reservation service. The decrease from the 1983 budget estimate to the 1983 current estimate is due to less than expected Federal Telecommunications Systems rate increases. The 1984 estimate projects rate increases in local services and FTS services as well as additional cost increases in other communications services.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of Dollars)		
2. Printing and Reproduction	14	40	35	37

This activity provides for administrative printing and copier service.

3. Transportation	1,344	1,854	1,494	1,759

This activity includes the cost of the support contract for bus, mail and package delivery, stock issuance and administrative aircraft maintenance. It also includes moving and hauling services and motor vehicle purchase and maintenance. The reduction from the 1983 budget estimate to the 1983 current estimate reflects FY 1982 experience and a rephasing of the support contractor funding plan. The 1984 estimate reflects the same level of effort as 1983 at anticipated support contractor cost rates and the full year funding of support contracts.

4. Installation Common Services	479	663	528	560

This funding provides minor administrative services for Center management and staff and administrative recordkeeping at Plum Brook Station. Also included is the cost of staff medical examinations, clinic support, medical supplies and equipment, and special x-ray equipment for the in-house occupational health program. These services are provided by a support contractor. This function also includes funding for maintenance and periodic replacement of administrative equipment and supplies, and postage. The decrease in the 1983 current estimate from the 1983 budget estimate reflects 1982 experience, and the 1984 estimate is for the same level of effort as 1983.

National Aeronautics and Space Administration
Organization and Staffing Chart
LEWIS RESEARCH CENTER
Cleveland, Ohio

STAFFING SUMMARY

	83	84
SES	30	30
GS-16	1	1
GS-15	97	97
GS-14	242	242
OTHER GS	1325	1325
WB	784	784
TOTAL	2479	2479

OFFICE OF THE DIRECTOR

	83	84
SES	4	4
OTHER GS	3	3
TOTAL	7	7

DIRECTOR OF TECHNOLOGY UTILIZATION & PUBLIC AFFAIRS

	83	84
GS-15	1	1
GS-14	1	1
OTHER GS	18	18
TOTAL	20	20

OFFICE OF EQUAL EMPLOYMENT OPPORTUNITY

	83	84
GS-14	1	1
OTHER GS	4	4
TOTAL	5	5

DIRECTOR OF AERONAUTICS

	83	84
SES	2	2
GS-14	1	1
OTHER GS	2	2
TOTAL	5	5

ENGINE SYSTEMS DIVISION

	83	84
SES	1	1
GS-15	4	4
GS-14	8	8
OTHER GS	48	48
TOTAL	61	61

PROPULSION AERODYNAMICS DIVISION

	83	84
SES	1	1
GS-15	5	5
GS-14	9	9
OTHER GS	57	57
TOTAL	72	72

AIRCRAFT PROPULSION DIVISION

	83	84
SES	1	1
GS-15	5	5
GS-14	8	8
OTHER GS	36	36
TOTAL	50	10

DIRECTOR OF ENERGY

	83	84
SES	1	1
OTHER GS	2	2
TOTAL	3	3

TRANSPORTATION PROPULSION DIVISION

	83	84
SES	1	1
GS-15	3	3
GS-14	16	16
OTHER GS	18	18
TOTAL	38	38

SOLAR AND ELECTROCHEMISTRY DIVISION

	83	84
SES	1	1
GS-15	3	3
GS-14	13	13
OTHER GS	40	40
TOTAL	57	57

WIND AND STATIONARY POWER DIVISION

	83	84
SES	1	1
GS-15	3	2
GS-14	13	12
OTHER GS	21	10
TOTAL	38	25

DIRECTOR OF SPACE

	83	84
SES	1	1
OTHER GS	1	1
TOTAL	2	2

MANAGEMENT OPERATIONS OFFICE

	83	84
OTHER GS	11	11
TOTAL	11	11

SPACE PROPULSION DIVISION

	83	84
SES	1	1
GS-15	3	3
GS-14	17	17
OTHER GS	55	55
TOTAL	76	76

SPACE COMMUNICATIONS DIVISION

	83	84
SES	1	1
GS-15	7	7
GS-14	16	17
OTHER GS	73	85
TOTAL	97	110

SPACE TRANSPORTATION ENGINEERING DIVISION

	83	84
SES	1	1
GS-15	3	4
GS-14	10	11
OTHER GS	114	110
TOTAL	128	126

SHUTTLE/CENTAUR PROJECT OFFICE

	83	84
SES	1	1
GS-15	2	2
GS-14	6	5
OTHER GS	8	8
TOTAL	17	17

ATLAS/CENTAUR PROJECT OFFICE

	83	84
GS-14	1	1
OTHER GS	6	6
TOTAL	7	7

DIRECTOR OF SCIENCE AND TECHNOLOGY

	83	84
SES	2	2
GS-15	1	1
GS-14	1	1
OTHER GS	1	1
TOTAL	5	5

MATERIALS DIVISION

	83	84
SES	1	1
GS-15	7	7
GS-14	18	19
OTHER GS	70	73
TOTAL	96	100

STRUCTURES AND MECHANICAL TECHNOLOGIES DIVISION

	83	84
SES	1	1
GS-15	9	9
GS-14	15	15
OTHER GS	51	51
TOTAL	76	76

FLUID MECHANICS AND ACOUSTICS DIVISION

	83	84
SES	1	1
GS-16	1	1
GS-15	7	7
GS-14	15	15
OTHER GS	47	47
TOTAL	71	71

AEROTHERMODYNAMICS AND FUELS DIVISION

	83	84
SES	1	1
GS-15	8	8
GS-14	17	15
OTHER GS	70	70
TOTAL	96	94

PHYSICS AND ELECTRONICS DIVISION

	83	84
SES	1	1
GS-15	5	5
GS-14	10	10
OTHER GS	50	50
TOTAL	66	66

DIRECTOR OF ENGINEERING SERVICES

	83	84
SES	2	2
OTHER GS	1	1
TOTAL	3	3

MASTER PLANNING OFFICE

	83	84
GS-15	[illegible]	2
GS-14	1	1
OTHER GS	2	2
TOTAL	5	5

COMPUTER SERVICES DIVISION

	83	84
SES	1	1
GS-15	2	2
GS-14	6	6
OTHER GS	63	63
WB	8	8
TOTAL	80	80

RELIABILITY AND QUALITY ASSURANCE OFFICE

	83	84
GS-15	1	1
GS-14	8	8
OTHER GS	19	19
TOTAL	28	28

ENGINEERING DESIGN DIVISION

	83	84
GS-15	3	3
GS-14	7	7
OTHER GS	53	53
TOTAL	63	63

FACILITIES ENGINEERING DIVISION

	83	84
GS-15	5	5
GS-14	8	8
OTHER GS	50	50
TOTAL	63	63

DIRECTOR OF TECHNICAL SERVICES

	83	84
SES	1	1
OTHER GS	3	3
TOTAL	4	4

SAFETY OPERATIONS OFFICES

	83	84
GS-14	1	1
OTHER GS	33	33
TOTAL	34	34

TEST INSTALLATIONS DIVISION

	83	84
GS-14	1	1
OTHER GS	1	1
WB	438	438
TOTAL	440	440

FACILITIES OPERATIONS & MAINTENANCE DIVISION

	83	84
GS-14	1	1
OTHER GS	16	16
WB	188	188
TOTAL	205	205

FABRICATION AND PROPERTY DIVISION

	83	84
OTHER GS	20	20
WB	144	144
TOTAL	164	164

DIRECTOR OF ADMINISTRATION

	83	84
SES	1	1
GS-15	1	1
GS-14	1	1
OTHER GS	5	5
TOTAL	8	8

OFFICES

	83	84
GS-15	3	3
GS-14	6	6
OTHER GS	18	18
TOTAL	27	27

PERSONNEL DIVISION

	83	84
GS-15	1	1
OTHER GS	33	33
TOTAL	34	34

FINANCIAL MANAGEMENT DIVISION

	83	84
GS-15	1	1
GS-14	1	1
OTHER GS	34	34
TOTAL	36	36

ACQUISITION DIVISION

	83	84
GS-15	1	1
GS-14	3	3
OTHER GS	93	93
TOTAL	97	97

RESOURCES PLANNING AND MANAGEMENT OFFICE

	83	84
GS-15	1	1
GS-14	1	1
OTHER GS	11	11
TOTAL	13	13

MANAGEMENT SERVICES DIVISION

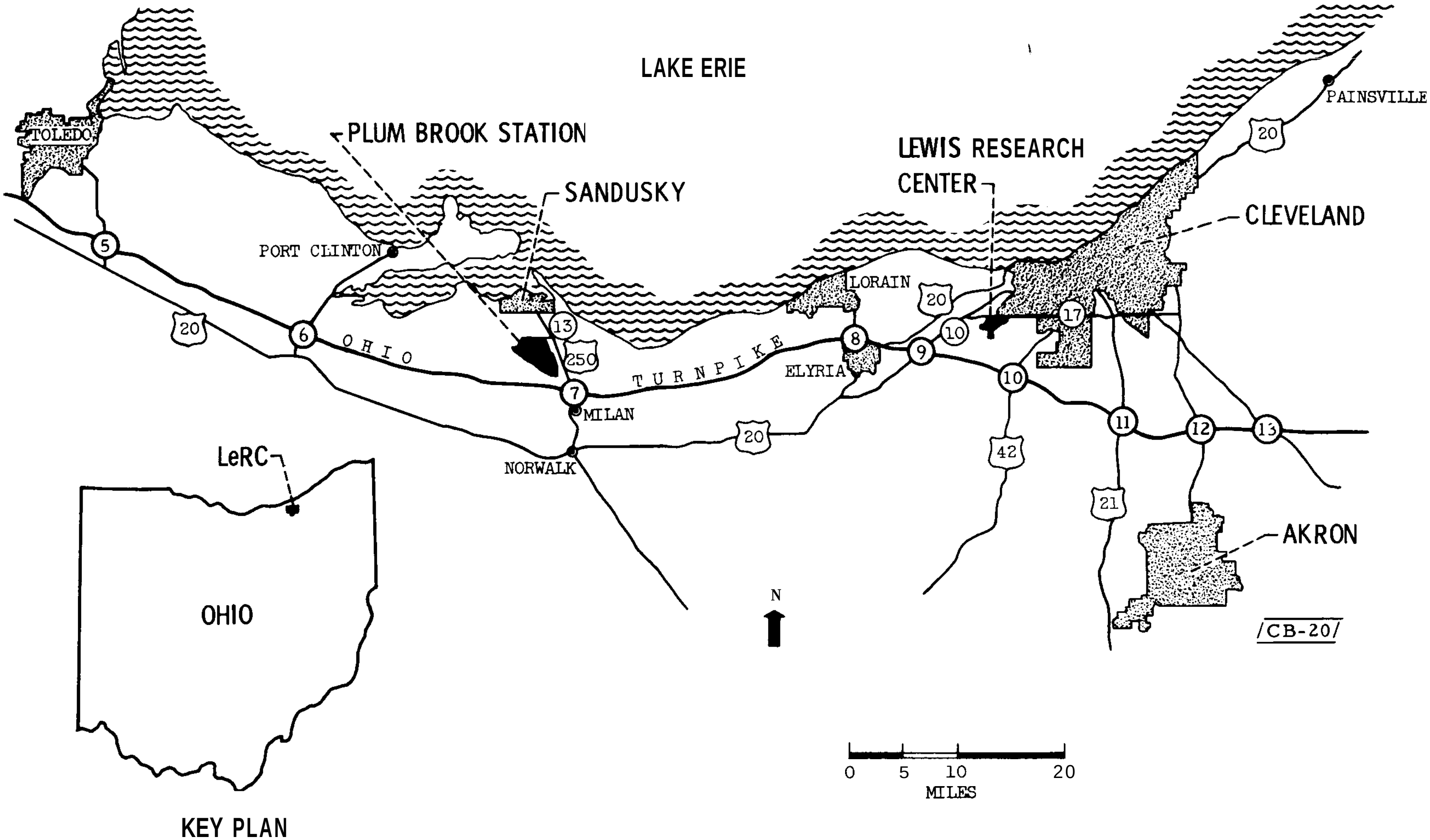
	83	84
GS-14	1	1
OTHER GS	64	64
WB	6	6
TOTAL	71	71

11/22/82

LEWIS RESEARCH CENTER

FISCAL YEAR 1984 ESTIMATES

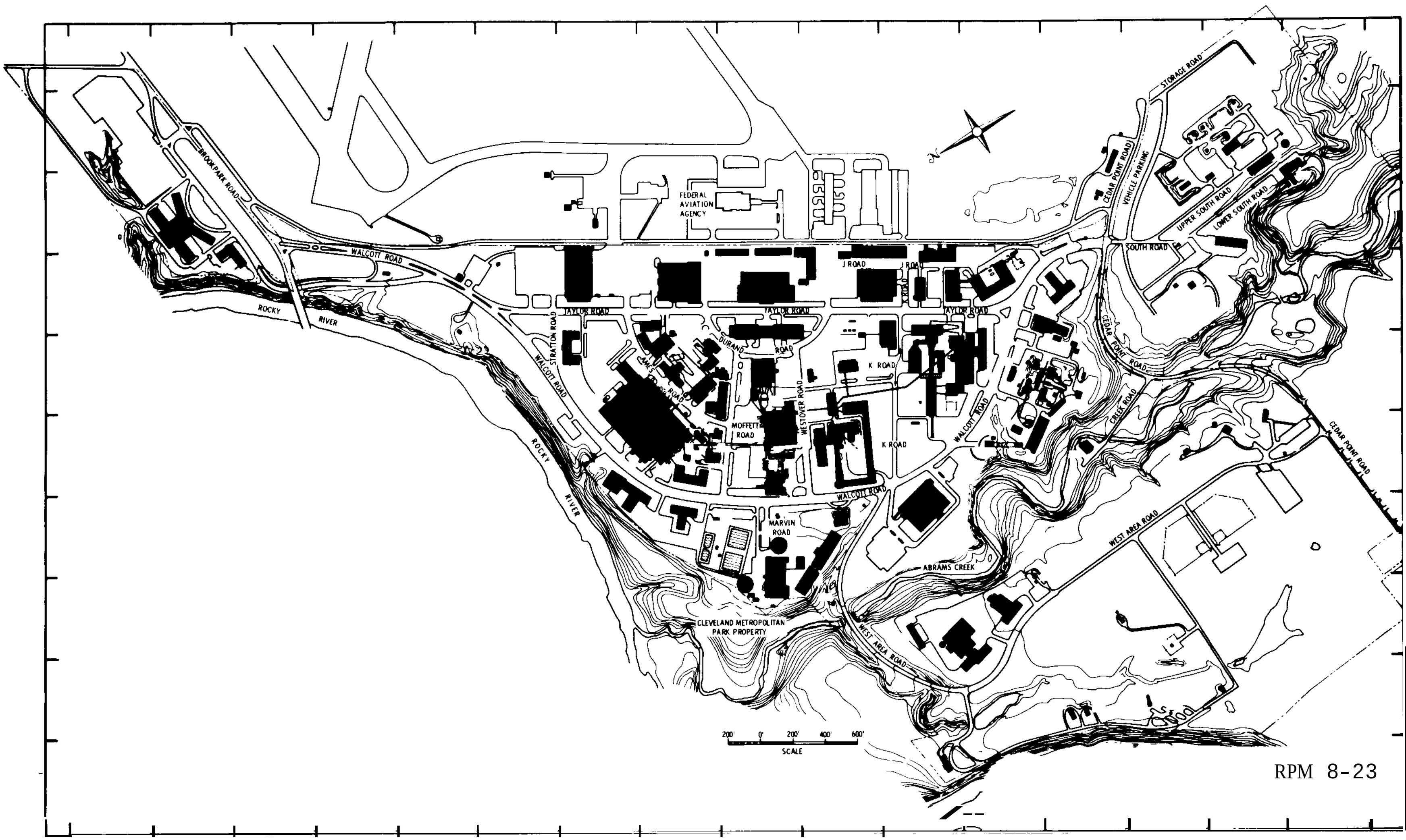
AREA MAP



LEWIS RESEARCH CENTER

FISCAL YEAR 1984 ESTIMATES

LOCATION PLAN



LEWIS RESEARCH CENTER

FISCAL YEAR 1984 ESTIMATES

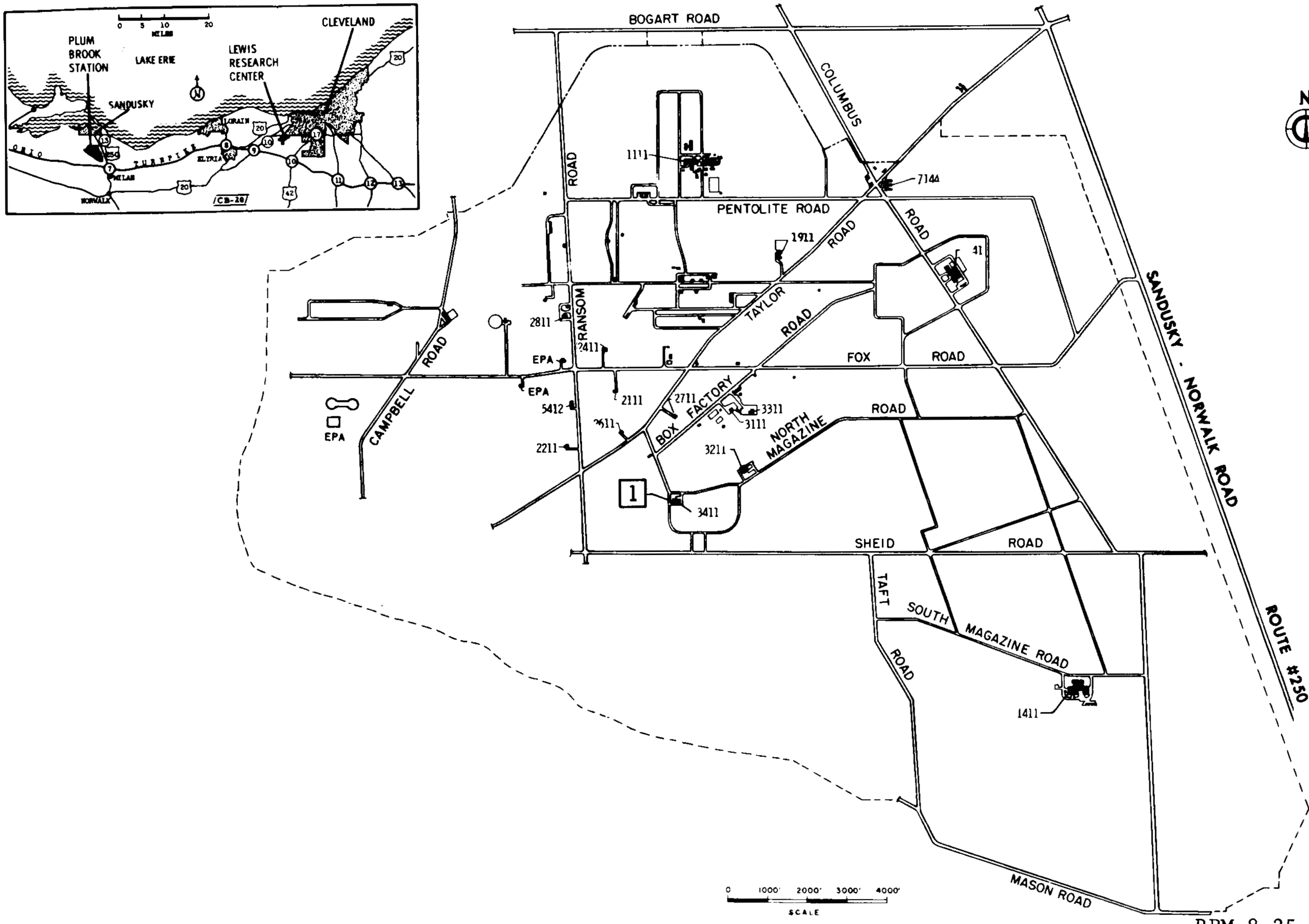
CLEVELAND FACILITIES

LEWIS RESEARCH CENTER

PLUM BROOK STATION

FISCAL YEAR 1984 ESTIMATES

LOCATION PLAN



REVISED JULY 31, 1980

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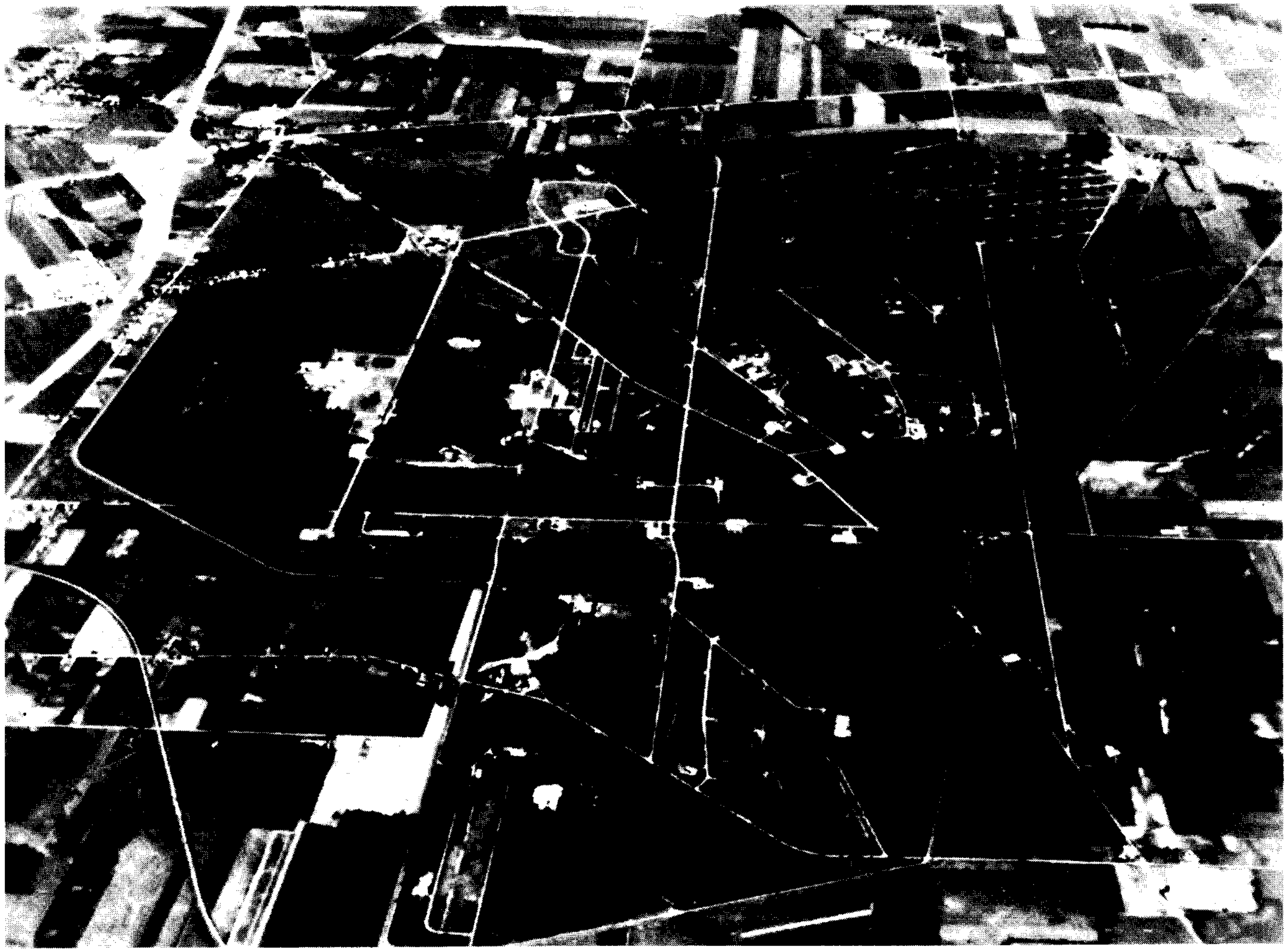
LEWIS RESEARCH CENTER

FISCAL YEAR 1984 ESTIMATES

PLUM BROOK FACILITIES



NASA
HEADQUARTERS

RESEARCH AND PROGRAM MANAGEMENT

FISCAL YEAR **1984 ESTIMATES**

NASA HEADQUARTERS

DESCRIPTION

NASA Headquarters is located at 400 Maryland Avenue, SW, Washington, D.C. , and occupies other buildings in the District of Columbia and Maryland. Except for **some** office space leased in the District of Columbia, personnel occupy Government-owned buildings.

HEADQUARTERS ROLES AND MISSIONS

The mission of Headquarters is to plan and provide executive guidelines for the implementation of national space and aeronautics programs consistent with the objectives stated in the National Aeronautics and Space Act of 1958, as amended. These objectives are to:

--Extend our knowledge of the Earth, its environment, the solar system, and the universe;

--Expand practical applications of space technology;

--Develop, operate, and improve manned and unmanned space vehicles;

--Improve the civil and military usefulness of aeronautical vehicles, while minimizing their environmental effects and energy consumption;

--Disseminate pertinent findings to potential users; and

--Promote international cooperation in peaceful activities in space.

The following offices at Headquarters assist management in carrying out the technical aspects of the mission:

office of Space Flight - Plans, directs, executes, and evaluates the research, development, acquisition and operation of space flight programs which includes the Space Shuttle, a reusable manned vehicle, the essential element of the Space Transportation System (STS) that will be used to conduct space operations. Included in the STS are the orbiters, engines, external tanks, solid rocket boosters, upper stages and ground systems. This office develops and implements necessary policy for all system users to interface with STS. Responsibilities also include development and implementation of appropriate transition policies for expendable launch vehicle users to transfer to the STS. The Office of Space Flight promotes improvements in effectiveness, cost efficiency and timeliness of STS operational performance. This office also maintains relationships with industry, international organizations, foreign entities, universitites, the scientific community, and other Government agencies with respect to the space flight program, including the spacelab program, in coordination with the Office of External Relations.

Office of Space Science and Applications - Responsible for research and development efforts utilizing a variety of flight system and ground-based observations to increase man's knowledge of the universe, The Earth, Sun, Moon, the planets, interplanetary space, other stars and galaxies, and the interaction among those bodies and systems are all objects of these investigations, as well as assuring medical safety and understanding the basic mechanisms of biological processes using the unique capabilities of the space program. Responsibilities also include conducting research and development activities leading to demonstration and transfer of space-related technology and capabilities which can be effectively applied and used for practical benefits on Earth. These research and development activities involve the following program areas: earth observations, environmental observations, communications, material processing in space, and information systems.

Office of Aeronautics and Space Technology - Plans, directs, executes, and evaluates the aeronautical and space research and technology programs. The aeronautics program develops technology culminating in safer, more efficient, economical and environmentally acceptable air transportation systems which are responsive to national needs. The space research and technology program provides a technology base which anticipates the technical needs and provides technology options for future space activities. The Office of Aeronautics and Space Technology is also responsible for coordinating the total NASA program of supporting research and technology related to specific programs and projects to insure a comprehensive, properly balanced agency research and technology program.

Office of Space Tracking and Data Systems - Develops, implements, and operates tracking, data acquisition, command, communications, and data processing facilities, systems and services required for support of all NASA flight missions. This office also provides centralized planning and systems management for the administrative communications of NASA installations.

Office of External Relations - Plans, directs, executes and evaluates the Technology Utilization program, whose purpose is to enhance national economic growth and productivity through the transfer of NASA developed technology to the non-aerospace sectors of the economy.

Research and Program Management (R&PM) funding is used to support the staffing and operation of NASA Headquarters in Washington, D.C. The overall capability of the Agency to operate effectively is dependent upon sufficient R&PM funds to hire and support a Headquarters workforce to furnish direction and coordinate the accomplishment of the Agency mission. This portion of the budget is prepared to accomplish the following objectives:

-- Provide a balanced Agency Headquarters workforce capable of planning, formulating, advocating and providing executive direction to national programs to implement the objectives stated in the National Aeronautics and Space Act of 1958, as amended.

-- Provide a balanced Headquarters supporting workforce capable of providing necessary administrative, operational and logistical support to those Headquarters elements concerned with carrying out the mission of the National Aeronautics and Space Administration.

-- Provide adequate facilities to house the workforce in Washington, D.C.

-- Provide for technical, administrative and logistical support necessary to facilitate accomplishment of NASA goals and objectives as administered by the Headquarters.

The Headquarters workforce consists of professional and clerical staff organized into the program offices indicated above and appropriate supporting staff offices. Funding for salaries, travel and necessary support services are included in this portion of the budget submission. Each office is assigned a function consistent with NASA Headquarters mission. The number of personnel authorized to an office is determined by management based on the approved personnel ceiling for the Agency and the functions to be performed. The composition of the staff of an office is determined by the head of the office based on the office ceiling and the function to be performed. All personnel are appointed and paid consistent with classification standards established by the Office of Personnel Management. Overall Agency direction is provided by the Administrator, and his personal office staff. He is assisted by heads of special and technical staff offices which perform functions necessary to the effective operation of the Agency and the Headquarters. Such offices are concerned with administrative management or support of the Headquarters. Included are such offices as the Chief Engineer, Chief Scientist, Comptroller, General Counsel, External Relations, Office of Management, Aerospace Safety Advisory panel, Equal Opportunity, Procurement and the Inspector General. The Agency currently has eight (8) installations, and Jet Propulsion Laboratory, throughout the United States which perform Agency operational missions under direction of the Headquarters staff.

Technical support required by Headquarters is performed primarily by support contractors, who support Headquarters automatic data processing and the scientific and technical information programs. Administrative support is provided by the in-house workforce assisted by miscellaneous contract services. Such support includes communications, printing, equipment, transportation, occupational medicine and health, and other administrative support services.

Facilities consist of GSA leased space at FB-6, FB-10B, and Reporters Building in Washington, D.C., and a facility at Baltimore-Washington Airport in Maryland.

SUMMARY OF RESOURCES REQUIREMENTS

Funding Plan by Function

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of Dollars)		
I. Personnel and Related Costs	67,020	68,360	72,179	73,356
II. Travel	3,277	4,270	4,150	4,485
III. Operation of Installation	39,458	39,993	35,555	42,107
A. Facilities Services	(5,875)	(8,580)	(8,653)	(9,062)
B. Technical Services	(22,296)	(19,918)	(16,654)	(21,512)
C. Management and Operations	(11,287)	(11,495)	(10,248)	(11,533)
Total, fund requirements	109,755	112,623	111,884	119,948

Distribution of Permanent Positions by Program

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
Direct Positions				
Space Transportation System	203	211	194	194
Space transportation capability development	175	183	153	143
Space transportation operations	28	28	41	51
Space Science and Applications	228	217	215	215
Physics and astronomy	69	65	65	65
Life sciences	35	23	33	33
Planetary exploration	27	30	26	26
Space applications	97	99	91	91
Technology Utilization	13	15	13	13
Aeronautics and Space Technology	131	113	122	122
Aeronautical research and technology	66	66	73	73
Space research and technology	47	47	49	49
Energy technology	18	---	---	---
Tracking and Data Acquisition	54	54	54	54
Subtotal, direct positions	629	610	598	598
Management and Operations Support	862	847	859	859
Total. permanent positions	1,491	1,457	1.457	1,457

RESOURCES REQUIREMENTS BY FUNCTION

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of Dollars)		
I. PERSONNEL AND RELATED COSTS....................	67,020	68,360	72,179	73,356

Summary of Fund Requirements

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
A. Compensation and Benefits				
1. Compensation				
a. Permanent positions......................	54,782	54,522	57,785	58,505
b. Other than full-time permanent positions	2,687	2,667	2,757	2,767
c. Reimbursable detailees.................	631	585	771	599
d. Overtime and other compensation.........	1,428	1,386	1,677	1,677
Subtotal, Compensation.	59,528	59,160	62,990	63,548
2. Benefits....................................	5,851	6,815	6,833	7,361
Subtotal, Compensation and Benefits...	65,379	65,975	69,823	70,909
B. Supporting Costs				
1. Transfer of personnel.......................	286	617	628	586
2. Office of Personnel Management services.....	208	294	254	275
3. Personnel training.........................	1,147	1,474	1,474	1,586
Subtotal, Supporting Costs...........	1,641	2,385	2,356	2,447
Total, Personnel and Related Costs..........	67,020	68,360	72,179	73,356

Explanation of Fund Requirements

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands	of Dollars)	
A. Compensation and Benefits......................	65,379	65,975	69,823	70,909
1. Compensation................................	59,528	59,160	62,990	63,548
a. Permanent positions....................	54,782	54,522	57,785	58,505

The current estimate for 1983 reflects a change from the 1983 budget estimate due to the recent pay increases.

Basis of Cost for Permanent Positions

In 1984, the cost of permanent positions will be $58,505,000. The increase from 1983 results from the following:

Cost of permanent positions in 1983............................		57,785
Cost increases in 1984...		+1,741
Within grade and career advances:		
Full year effect of 1983 actions........................	+873	
Partial year effect of 1984 actions......................	+543	
Full year effect of 1983 pay increases....................	+325	
Cost decreases in 1984...		-1,021
Turnover savings and abolished positions:		
Full year effect of 1983 actions..........................	-175	
Partial year effect of 1984 actions.....................	-444	
One less paid day in 1984..................................	-205	
Alteration in the method of calculation of salaries paid (PL 97-253)..	-197	
Cost of permanent positions in 1984..		58,505

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of Dollars)		
b. Other than full-time permanent positions				
(1) Cost	2,687	2,667	2,757	2,767
(2) Workyears	158	164	158	157

The distribution of 1984 workyears is as follows:

Distribution of Other Than Full-Time Permanent Workyears

Program	Workyears
Developmental programs	30
Summer employment programs	21
Youth opportunity programs	22
Other temporary	84
Total	157

The increase from the 1983 budget estimate to the 1983 current estimate is a result of the recent pay increase. The 1984 estimate is essentially level with 1983.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
c. Reimbursable detailees	631	585	771	599

The services of a small group of military officers and civilian detailees from other government agencies are used by NASA Headquarters where such assignments are of mutual benefit. The increase from the 1983 budget estimate to the 1983 current estimate is attributable to the recent pay increases and an increase in the number of detailees. The 1984 budget estimate reflects a decrease in the number of detailees.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of Dollars)		
d. Overtime and other compensation..........	1,428	1,386	1,677	1,677

The increase from the 1983 budget estimate to the 1983 current estimate is a result of the recent pay increase and more accurately reflects 1982 experience.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
2. Benefits..................................	5,851	6,815	6,833	7,361

The following are the amounts of contribution by category:

civil Service Retirement Fund............	3,930	4,043	4,158	4,225
Employee life insurance..................	156	179	176	180
Employee health insurance................	1,031	1,025	1,252	1,474
Workmen's compensation....................	464	1,071	469	579
FICA.....................................	80	67	80	82
Medicare.................................	---	---	480	603
other benefits...........................	190	430	218	218
Total..................................	5,851	6,815	6,833	7,361

The increase in the 1983 current estimate from the 1983 budget estimate is primarily due to the recent pay increases and increased health benefits, including NASA's share of Medicare costs. The workman's compensation estimates are those provided by the Department of Labor.

B. Supporting Costs..............................	1,641	2,385	2,356	2,447
1. Transfer of personnel......................	286	617	628	586

The costs associated with transfer of personnel include movement of household goods, subsistence and temporary expenses, real estate and miscellaneous moving expenses related to change of duty station. The decrease from the 1983 budget estimate to the 1983 current estimate reflects a revised number of relocations. The 1984 estimate reflects anticipated changes in costs to be paid.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
	(Thousands of Dollars)			
2. Office of Personnel Management services.....	208	294	254	275

Headquarters reimburses the Office of Personnel Management (OPM) and others for investigation of new hires for the entire Agency. The cost of investigations is a function of two variables, the number of investigations to be conducted, and the unit charge made by the Office of Personnel Management to other agencies. Also included is a payment to OPM for Federal wage system surveys.

3. Personnel training..........................	1,147	1,474	1,474	1,586

The maintenance and expansion of skills is essential in carrying out the Agency's many complex technical programs. Part of the training consists of courses offered by other Government agencies, usually for a fee. The remainder of the training is provided through nongovernmental sources. The costs are for tuition, fees and related costs for training at colleges, universities, technical institutions, and for the cost of seminars and workshops in which groups of Headquarters and Field Center employees receive training in subjects of Agencywide interest. The increase in 1984 provides for a constant level of training at anticipated tuition cost levels.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of Dollars)		
II. TRAVEL..	3,277	4,270	4,150	4,485

Summary of Fund Requirements

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
A. Program Travel.................................	1,699	2,500	2,453	2,687
B. Scientific and Technical Development Travel.....	447	491	478	523
C. Management and Operations Travel................	1,131	1,279	1,219	1,275
Total, Travel..............................	3,277	4,270	4,150	4,485

Explanation of Fund Requirements

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
A. Program Travel.................................	1,699	2,500	2,453	2,687

Program travel funds are used in support of NASA's research and development programs, such as the Space Transportation System, Aeronautics and Space Technology, Space Science and Applications, and other direct research and development programs. This category represents approximately 60 percent of the Headquarters travel requirements for 1984. The decrease from the 1983 budget estimate to the 1983 current estimate reflects a partial application of the reductions required because of the appropriation reduction and pay raise absorption. The 1984 estimate provides for planned travel requirements at anticipated travel price levels.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
B. Scientific and Technical Development Travel.....	447	491	478	523

Scientific and technical development travel permits employees to participate in meetings and seminars with other representatives of the aerospace community. This participation allows personnel to benefit from exposure to technological advances in the field which arise outside NASA, as well as to present both accomplishments and problems to their associates. Many of these meetings are working panels convened to solve certain problems for the benefit of the Government. The 1984 estimate reflects current travel requirement and anticipated cost levels.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of Dollars)		
C. Management and Operations Travel...............	1,131	1,279	1,219	1,275

Management and operations travel is for the direction and coordination of general management matters, travel by senior officials to review Center requirements and operations. Travel by functional managers in such areas as personnel, financial management , and procurement to assure Agency policies and procedures are being implemented throughout the agency; local transportation; and congressional travel. The 1984 estimate reflects anticipated travel cost levels.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
III. OPERATION OF INSTALLATION.....................	39,458	39,993	35,555	42,107

Summary of Fund Requirements

A. Facilities Services............................	5,875	8,580	8,653	9,062
B. Technical Services..................,...........	22,296	19,918	16,654	21 ,512
C. Management and Operations	11,287	11,495	10 ,248	11,533
Total, Operation of Installation...........	39,458	39 ,993	35 ,555	42,107

Explanation of Fund Requirements

Operation of Installation provides a broad range of services, supplies, and equipment in support of the Headquarters' institutional activities. These are divided into three major functional areas: Facilities Services, rental of real property, acquisition, maintenance and repair of institutional facilities and equipment, and the cost of custodial services; Technical Services, the cost of automatic data processing for management activities, and the cost of educational and informational programs and technical shops supporting institutional activities; and Management and Operations, the cost of administrative communications, printing, transportation, medical supplies, and related services.

The decrease from the 1983 budget estimate to the 1983 current estimate is primarily due to the delay and deferral of activities and a rephasing of support contractor funding plans to accommodate the appropriation reduction and partial absorption of increased pay costs.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of Dollars)		
A. FACILITIES SERVICES................................	5,875	8,580	8,653	9,062

NASA Headquarters is comprised of a complex of buildings in the District of Columbia and Maryland. These are government-owned and leased buildings for which NASA must provide reimbursement to the General Services Administration (GSA) in accordance with P.L. 92-313.

The current complex encompasses some 529,000 gross square feet of building space including four buildings. This complex of primary office space supports an average daily Headquartes population of 1,900 personnel.

Summary of Fund Requirements

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of Dollars)		
1. Rental of Real Property....................	4,964	7,430	7,464	8,006
2. Maintenance and Related Services...........	676	880	919	772
a. Facilities.............................	674	880	919	772
b. Equipment	2	---	---	---
3. Custodial Services.........................	235	270	270	284
Total, Facilities Services................	5,875	8,580	8,653	9,062

Explanation of Fund Requirements

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
1. Rental of Real Property.....................	4,964	7,430	7,464	8,006

Public Law 92-313 requires that agencies be charged for space and related services provided by the General Services Administration at approximate commercial equivalent rates. These funds provide for the cost of office space used by NASA Headquarters personnel. The increases in 1983 and 1984 estimates reflect increased rental rates as projected by GSA.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
2. Maintenance and Related Services...........	676	880	919	772

This estimate includes maintenance, repair and alterations of buildings such as partition changes, telephone changes and general buildings maintenance. The increase from the 1983 budget estimate to the 1983 current estimate is primarily due to the Headquarters reorganization which resulted in changes in the utilization of office space. The 1984 estimate includes anticipated supply and equipment costs.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of Dollars)		
3. Custodial Services	235	270	270	284

These funds cover security guard services in the various Headquarters buildings. They also include reimbursement to GSA for the installation and maintenance of security alarm systems and equipment in the NASA Headquarters buildings. The increase in the 1984 current estimate reflects increased rates as projected by GSA.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
B. TECHNICAL SERVICES.............................	22,296	19,918	16,654	21,512

Summary of Fund Requirements

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
1. Automatic Data Processing	8,351	7,545	6,601	8,260
a. Equipment	2,837	1,063	1,492	2,102
b. Operations	5,514	6,482	5,109	6,158
2. Scientific and Technical Information........	13,361	11,667	9,529	12,598
a. Library	410	382	361	379
b. Education and Information..............	12,951	11,285	9,168	12,219
3. Shop and Support Services..................	584	706	524	654
Total, Technical Services..	22,296	19,918	16,654	21,512

Explanation of Fund Requirements

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
1. Automatic Data Processing	8,351	7,545	6,601	8,260

This estimate provides for the lease, purchase, maintenance, programming and operations services of automatic data processing (ADP) equipment. The decrease from the 1983 budget to the 1983 current estimate reflects rephasing of support contract funding plans. The 1984 estimate reflects greater reliance on ADP for improved efficiency and productivity as well as a full year funding of support contracts.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of Dollars)		
2. Scientific and Technical Information........	13,361	11,667	9,529	12,598

Three major activities are contained in this subfunction; educational-informational programs, NASA Headquarters scientific and technical information activity, and the NASA technical library.

The education and information programs provide for the gathering and dissemination of information about the Agency's programs to the mass communications media, the general public, and to the educational community at the elementary and secondary levels. Assistance to the mass communications media includes the gathering and exposition of newsworthy material in support of their requests, and takes such forms as press kits, news releases, television and radio information tapes and clips, and feature material. Research, development, and operational missions in aeronautics and space provide substantive knowledge and serve as an educational stimulus to students and teachers. NASA responds to expressed needs of students by developing curriculum supplements in space-related areas such as physics, biology, chemistry, and math; assistance to over 1,000 teacher workshops and professional education meetings; and participation in science fairs. This program also provides for Equal Employment Opportunity exhibits and films to relate to high schools, colleges and the public, and the key roles that women and minorities have in the United States space program.

The scientific and technical information activity includes the cost of NASA Scientific and Technical Information Facility, documentation and publication services, systems development, and translation services. The largest requirement is the NASA Scientific and Technical Facility, with an estimated cost of $5.1 million in 1984. The cost of all other information and education services is for the documentation of worldwide aerospace journal and report literature; monographs and technical reviews; analyzing, evaluating, and testing new methods and systems in the field of scientific communications to increase the effectiveness of the technical information program; and translating foreign language materials, required to meet the needs of NASA and its contractor scientific personnel to keep abreast of world developments in the space science and related fields.

The technical libraries provide reference acquisition, cataloging, translating and dissemination services to all NASA employees.

The decrease in the 1983 current estimate from the 1983 budget estimate reflects rephasing of support contract funding plans. The 1984 estimate reflects full funding of essentially the same level of services as in 1983.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of Dollars)		
3. Shop and Support Services	584	706	524	654

These funds provide for the continuation of studies on parts applications, NASA-wide safety, reliability, quality assurance standards, graphic and photo processing services. The decrease from the 1983 budget estimate to the 1983 current estimate reflects a decrease in technical documentation requirements and a rephasing of support contract funding plans. The 1984 budget estimate reflects anticipated price levels and the full year funding of support contracts.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
C. MANAGEMENT AND OPERATIONS	11,287	11,495	10,248	11,533

Summary of Fund Requirements

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
1. Administrative Communications	2,131	2,514	2,351	2,819
2. Printing and Reproduction	1,092	1,583	1,530	1,606
3. Transportation	1,931	555	507	537
4. Installation Common Services	6,133	6,843	5,860	6,571
Total, Management and Operations	11,287	11,495	10,248	11,533

Explanation of Fund Requirements

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of Dollars)		
1. Administrative Communications..............	2,131	2,514	2,351	2,819

Included in this category are the costs of leased lines, long distance tolls, telephone exchange services, and other communications. The decrease from the 1983 budget estimate to the 1983 current estimate is due to a reduction in supplies and materials. The 1984 estimate reflects rate changes for both local service and FTS.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
2. Printing and Reproduction	1,092	1,583	1,530	1,606

Administrative printing includes funds for contractual printing and the related composition and binding operations. This includes services performed by other agencies, chiefly the Government Printing Office, or by commercial printing firms. All common processes of duplicating including photostating, blueprinting, microfilming, and other reproductions are included. The decrease from the 1983 budget estimate to the 1983 current estimate reflects a reduction in the level of printing activity. The 1984 estimate includes anticipated increases in the cost of paper, supplies and materials.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
3. Transportation.	1,931	555	507	537

Transportation services include rental of trucks, as well as the movement of supplies, materials, equipment and related items. Also included is the cost of operating and maintaining the administrative aircraft which is assigned to the Jet Propulsion Laboratory. The decrease from the 1983 budget estimate to the 1983 current estimate is due to reduced requirements. The 1984 estimate reflects anticipated increases in costs for operation and maintenance.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
4. Installation Common Services...............	6,133	6,843	5,860	6,571

This function provides for those services which support the Headquarters, such as: patent services, maintenance and repair of office equipment and vehicles; minor Government services; contract histories; trucking and labor services; medical services; contractor incentive awards; Equal Opportunity community relations and fellowships; Administrator's representation allowance; overseas administration support and documentation; and administrative supplies, materials and equipment. The decrease from the 1983 budget estimate to the 1983 current estimate is due to deferral in purchase of supplies and materials. The 1984 budget estimate is based on anticipated support contractor wage rate increases and an increase in the cost of supplies and materials.

ORGANIZATION AND STAFFING

NASA HEADQUARTERS

HEADQUARTERS SUMMARY STAFFING

	FY 83	FY 84
EXCEPTED & SES	237	237
GM/GS-18	1	1
GM/GS-16	1	1
GM/GS-15	302	302
GM/GS-14	241	241
ALL OTHER GM/GS	667	667
WAGE BOARD	8	8
TOTAL PERM.	1457	1457

ADMINISTRATOR

EXCEPTED & SES		
GM/GS-16		
GM/GS-15		
GM/GS-14		
ALL OTHER GM/GS	3	
WAGE BOARD		
TOTAL PERM.	23	23

CHIEF SCIENTIST

	FY 83	FY 84
EXCEPTED & SES	1	1
GM/GS-16	-	-
GM/GS-15	-	-
GM/GS-14	-	-
ALL OTHER GM/GS	1	1
WAGE BOARD	-	-
TOTALPERM	2	

CHIEF ENGINEER

	FY 83	FY 84
EXCEPTED & SES	4	4
GM/GS-16	8	8
GM/GS-14		3
ALL OTHER GM/GS	21	21
WAGE BOARD		
TOTAL PERM.	36	36

EQUAL OPPORTUNITY

	FY 83	FY 84
EXCEPTED & SES	4	4
GM/GS-16	-	-
GM/GS-15	-	-
GM/GS-14	4	4
ALL OTHER GM/GS	14	14
WAGE BOARD	-	-
TOTAL PERM.	22	22

PROCUREMENT

	FY 83	FY 84
EXCEPTED & SES	10	10
GM/GS-16	-	
GM/GS-15	16	16
GM/GS-14	20	20
ALL OTHER GM/GS	39	39
WAGE BOARD	-	-
TOTAL PERM.	85	85

LEGISLATIVE AFFAIRS

	FY 83	FY 84
EXCEPTED & SES	4	4
GM/GS-16	-	-
GM/GS-15	3	3
GM/GS-14	4	4
ALL OTHER GM/GS	15	15
WAGE BOARD	1	1
TOTAL PERM.	27	27

SMALL & DISADVANTAGED BUSINESS UTILIZATION

	FY 83	FY 84
EXCEPTED & SES	-	-
GM/GS-16	-	-
GM/GS-15	1	1
GM/GS-14	1	1
ALL OTHER GM/GS	2	2
WAGE BOARD		-
TOTALPERM.	4	4

STAFF ADVISORS

AEROSPACE SAFETY ADVISORY PANEL

PUBLIC AFFAIRS

INTERNATIONAL AFFAIRS

INSPECTOR GENERAL

	FY 83	FY 84
EXCEPTED & SES	5	5
GM/GS-16	-	-
GM/GS-15	10	10
GM/GS-14	12	12
ALL OTHER GM/GS	71	71
WAGE BOARD	-	-
TOTAL PERM.	98	98

GENERAL COUNSEL

	FY 83	FY 84
EXCEPTED & SES	7	7
GM/GS-16	-	-
GM/GS-15	13	13
GM/GS-14	2	2
ALL OTHER GM/GS	15	15
WAGE BOARD		
TOTAL PERM.	37	37

COMPTROLLER

	FY 83	FY 84
EXCEPTED & SES	17	17
GM/GS-16	-	-
GM/GS-15	12	12
GM/GS-14	22	22
ALL OTHER GM/GS	63	63
WAGE BOARD		
TOTAL PERM.	114	114

MANAGEMENT

	FY 83	FY 84
EXCEPTED & SES	34	34
GM/GS-18	1	1
GM/GS-16	1	1
GM/GS-15	45	45
GM/GS-14	58	58
ALL OTHER GM/GS	149	149
WAGE BOARD	6	6
TOTAL PERM.	294	294

EXTERNAL RELATIONS

	FY 83	FY 84
EXCEPTED & SES	21	21
GM/GS-16	-	-
GM/GS-15	25	25
GM/GS-14	24	24
ALL OTHER GM/GS	60	60
WAGE BOARD	-	-
TOTAL PERM.	130	130

AERONAUTICS AND SPACE TECHNOLOGY

	FY 83	FY 84
EXCEPTED & SES	27	27
GM/GS-16	-	-
GM/GS-15	40	40
GM/GS-14	18	18
ALL OTHER GM/GS	37	37
WAGE BOARD	-	-
TOTAL PERM.	122	122

SPACE SCIENCE AND APPLICATIONS

	FY 83	FY 84
EXCEPTED & SES	42	42
GM/GS-16	-	27
GM/GS-15	61	64
GM/GS-14	27	27
ALL OTHER GM/GS	84	
WAGE BOARD	1	
TOTAL PERM.	215	215

SPACE FLIGHT

	FY 83	FY 84
EXCEPTED & SES	41	41
GM/GS-16	-	-
GM/GS-15	55	55
GM/GS-14	29	29
ALL OTHER GM/GS	69	69
WAGE BOARD	-	-
TOTAL PERM.	194	194

SPACE TRACKING AND DATA SYSTEMS

	FY 83	FY 84
EXCEPTED & SES	12	
GM/GS-16	-	
GM/GS-15	13	
GM/GS-14	15	
ALL OTHER GM/GS	14	
WAGE BOARD	-	
TOTAL PERM.	54	54

SPECIAL ANALYSES

RESEARCH AND PROGRAM MANAGEMENT

FISCAL YEAR 1984 ESTIMATES

JET PROPULSION LABORATORY

DESCRIPTION

The Jet Propulsion Laboratory (JPL) is located in Pasadena, California, approximately 20 miles north of downtown Los Angeles. Subsidiary facilities are located at Goldstone, California (tracking and data acquisition), Edwards Air Force Base, California (propellant formulation and testing), and Table Mountain, California (open air testing and astronomy).

At Pasadena, the Laboratory occupies 176 acres of land of which 156 acres are owned by NASA and 20 acres are leased. At Goldstone, facilities are located on land occupied under permit from the Army. At Edwards Air Force Base, facilities are located on land occupied under permit from the Air Force. Facilities at Table Mountain are located on land occupied under permit from the Forest Service of the Department of Agriculture. The capital investment of the Jet Propulsion Laboratory, including the Deep Space Network, fixed assets in progress, and contractor-held facilities, as of September 30, 1982, was $452,884,000.

The Jet Propulsion Laboratory is a Government-owned installation that is staffed and managed by the California Institute of Technology. Contract NAS7-918 between NASA and Caltech governs research, development, and related activities at the Laboratory with facilities being provided under a separate facilities contract **NAS7-270(F).** The cost of operating JPL for NASA activities is borne by the Research and Development appropriation, except for the lease or purchase of administrative aircraft and the purchase of passenger motor vehicles, which are funded from the Research and Program Management appropriation and are included in the NASA Headquarters budget. Accordingly, the Research and Program Management type costs presented in this special analysis for JPL are for purposes of comparison only and are not a part of the NASA Research and Program Management budget.

ROLES AND MISSION

The Jet Propulsion Laboratory is assigned primary responsibility for the conduct of NASA automated missions concerned with deep space scientific exploration; tracking, data acquisition, reduction and analysis required by deep space flight; and development of advanced spacecraft propulsion, guidance and control systems. The Laboratory is also assigned responsibility for selected automated Earth-orbital projects. Implicit in these assignments is a broad range of engineering, scientific, and management functions devoted to:

1. The conduct of complete spaceflight projects, including overall project management and all phases of project activity beginning with mission design and following with spacecraft design, development, testing, flight operations, and data analysis.

2. The development and operation of the Deep Space Network which provides tracking and data acquisition services for all NASA projects involving missions beyond near-Earth orbits.

3. Continuing programs of scientific investigation, and research and analysis.

In more specific terms, the principal Laboratory activities in support of NASA can be categorized as follows:

Planetary Exploration - Since the beginning of the Nation's space activities, the Jet Propulsion Laboratory has devoted a major part of its efforts to exploration of the planets, their satellites, and the interplanetary medium. The Laboratory has had project management responsibility for all of the Mariner missions, including the functions of design, fabrication, assembly and testing of the spacecraft. For two decades, beginning with the Mariner 2 flight to Venus in 1962, these missions have provided an enormous scientific return. The two most recently completed missions in the Mariner series are those of Mariner 9, which returned scientific data for nearly a year from a Martian orbit, and Mariner 10, which gathered data in a close flyby of Venus followed by three separate encounters with Mercury.

The Jet Propulsion Laboratory was a major participant in the Viking project, carrying out, among other assignments, the development of the two orbiters which, with the two Landers, reached Mars during the summer of 1976. The Viking mission operations were repeatedly extended as the spacecraft far out-lived their design lifetimes. One Viking lander and the two Viking orbiters have now completed operations, but Viking Lander 1 continues to function and is programmed to transmit scientific data to Earth at weekly intervals for several more years.

In the continuing series of planetary missions, the Jet Propulsion Laboratory has management responsibility for the Voyager mission. The two Voyager spacecraft were launched in 1977 and made close flybys of Jupiter and its major satellites in 1979. In 1980 and 1981 the Voyager spacecraft encountered Saturn. The Voyager planetary encounters obtained exceptionally unique scientific data. Voyager 2 is now enroute to Uranus for a flyby in 1986. In the meantime, Voyager 1 continues to collect and transmit data on the interplanetary space environment as it proceeds out of the solar system.

The Jet Propulsion Laboratory also has project management responsibility for the Galileo mission, which is planned to orbit Jupiter and send an instrumented probe into the planet's atmosphere. The probe will make direct measurements of the physical and chemical properties of the Jovian atmosphere. The orbiter, with an in-orbit lifetime of 20 months, will observe Jupiter and severai of its major satellites at close range. JPL is the management center for the total project (orbiter and probe) and is developing the orbiter in-house. The Ames Research Center is responsible for the probe development.

The International Solar Polar Mission is a cooperative effort between NASA and the European Space Agency (ESA). JPL is managing United States principal investigator instrument development, to fly on the ESA spacecraft, and data analysis, as well as providing mission support to ESA. ESA is developing the spacecraft and instruments.

Development of the Venus Radar Mapper mission will begin in FY 1984 leading to a launch in 1988 to obtain global radar imagery of Venus sufficient to address fundamental questions regarding the origin and evolution of the planet. The Jet Propulsion Laboratory will manage the project and will contract with industry for the development of the spacecraft and synthetic aperture radar. JPL will be responsible for the mission design and the mission operations.

Physics and Astronomy - Consistent with its role as a center for Earth-orbital spacecraft development, JPL is managing the Infrared Astronomical Satellite project. This is a cooperative mission with the Netherlands and the United Kingdom. The spacecraft is being designed and built in the Netherlands, while JPL is responsible for science experiment development and system testing activities which are now in progress. The launch is scheduled for early in 1983.

JPL is also managing an atmospheric science satellite, the Solar Mesosphere Explorer, which was launched from the Western Test Range on October 6, 1981, into a sun-synchronous polar orbit. The spacecraft module was developed under a JPL contract with private industry, and the five science instruments were developed by the Laboratory for Atmospheric and Space Physics at the University of Colorado.

Space Applications - In support of the Space Applications program, JPL is a principal Center for work in oceanographic applications of space technology. The Laboratory also conducts significant activities in upper atmospheric research; in development and implementation of remote sensing techniques for Earth resources observations; and in geodynamics and plate tectonics research.

Spacecraft Operations - The Jet Propulsion Laboratory is responsible for the design, development, maintenance, and operation of NASA's worldwide Deep Space Network (DSN) and a Mission Control and Computing Center. The Deep Space Network tracking stations are located in California, Spain, and Australia, and supports projects involving flights beyond near-Earth orbit. The Mission Control and Computing Center, located at JPL, is the location of actual day to day operations of deep-space missions such as Voyager. JPL is also implementing the Network Consolidation program which will co-locate the residual Space Tracking and Data Network (STDN) near-Earth tracking stations (after the TDRSS becomes operational and eight STDN stations are closed) with the DSN stations located in California, Spain, and Australia. These consolidated facilities will be managed by JPL and will provide a more efficient, technically advanced and cost effective means of operations by the mid-1980's.

Research and Analysis - The Jet Propulsion Laboratory maintains an effective program of advanced technical development to provide sound technologies for present and prospective project assignments and to further the general capabilities of NASA. Areas of involvement include spacecraft advanced development, autonomous systems, space power and propulsion systems, electronics, information systems technology, and basic research in such fields as fluid physics, polymer materials and applied mathematics. The Laboratory participates in scientific experiments on both JPL-managed and non-JPL-managed flight projects. This participation includes not only the performance of scientific investigations, but also a significant commitment to the development of scientific instruments for use in space missions. Ground-based research programs are carried out in the planetary sciences, physics and astronomy, and Earth and ocean physics. These activities involve broad collaboration with the scientific and academic communities and with staff members from other NASA field installations.

Distribution of JPL Staff by NASA Program

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
Direct Staff				
Space Transportation System	7	4	13	15
Space transportation capability development	6	4	6	6
Space transportation operations	1	---	7	9
Space Science and Applications	1,319	1,247	1,252	1,192
Physics and astronomy	166	154	143	87
Life sciences	21	33	28	27
Planetary exploration	849	688	757	717
Space applications	283	372	324	361
Technology Utilization	11	3	6	4
Aeronautics and Space Technology	200	234	213	213
Aeronautical research and technology	8	1	7	7
Space research and technology	190	233	206	206
Energy technology	2	---	---	---
Tracking and Data Systems Acquisition	469	480	499	500
Subtotal, direct staff	2,006	1,968	1,983	1,924
Direct Support	491	565	486	471
Management and Operations Support	1,075	1,051	1,061	1,029
Total, permanent staff	3,572	3,584	3,530	3,424

SIMULATED RESEARCH AND PROGRAM MANAGEMENT BUDGET

Funding Plan by Function

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of Dollars)		
I. Personnel and Related Costs..................	150,325	154,383	166,530	161,580
11. Travel......................................	5,286	8,224	5,480	5,580
III. Operation of Installation.....................	31,606	40,006	33,680	35,740
A. Facilities Services......................	(17,852)	(20,933)	(18,730)	(20,050)
B. Technical Services.......................	(4,612)	(6,734)	(5,030)	(5,280)
C. Management and Operations	(9,142)	(12,339)	(9,920)	(10,410)
Total, fund requirements	187,217	202,613	205,690	202,900

EXPLANATION OF FUND REQUIREMENTS

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of Dollars)		
I. **PERSONNEL AND RELATED COSTS**.............	150,325	154,383	166,530	161,580

The increase from the 1983 budget estimate to the 1983 current estimate is due to the cost of pay increases and associated employee benefits. The decrease from the 1983 current estimate to the 1984 estimate is due to the reduced workforce.

II. **TRAVEL**..	5,286	8,224	5,480	5,580

The decrease from the 1983 budget estimate to the 1983 current estimate is due to reassessment of requirements based on current programmatic activity. The increase from the 1983 current estimate to the 1984 estimate is due to expected higher airfares, hotel rates, and rental car costs.

III. **OPERATION OF INSTALLATION**.....................	31,606	40,006	33,680	35,740
A. Facilities Services........................	(17,852)	(20,933)	(18,730)	(20,050)

The decrease from the 1983 budget estimate to the 1983 current estimate is due to decreased utility costs and reduced equipment purchases. The increase from the 1983 current estimate to the 1984 estimate is due to anticipated utility rate increases and increased cost of facilities maintenance.

B. Technical Services........................	(4,612)	(6,734)	(5,030)	(5,280)

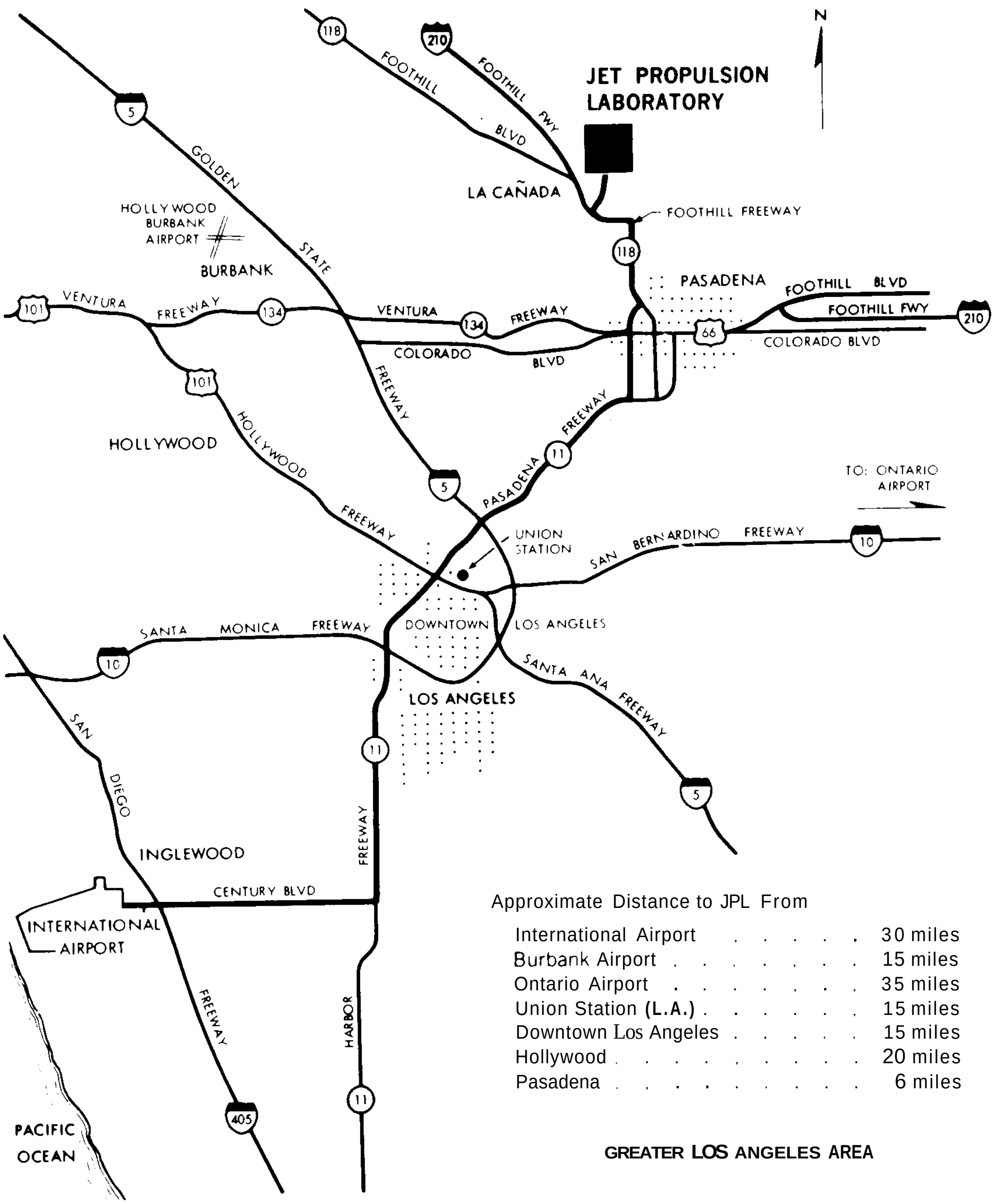
The decrease from the 1983 budget estimate to the 1983 current estimate reflects reduced engineering and documentation services based on current requirements. The 1984 estimate reflects increased costs for a continuing level of services.

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
		(Thousands of Dollars)		
C. Management and Operations.	(9,142)	(12,339)	(9,920)	(10,410)

The decrease from the 1983 budget estimate to the 1983 current estimate is due to lower usage of supplies, materials and equipment, partially offset by increased communication costs. The increase from the 1983 current estimate to the 1984 estimate is attributable to further increases in communications reflecting higher rates, and increased costs for documentation, transportation and other administrative costs.

JET PROPULSION LABORATORY

FISCAL YEAR 1984 ESTIMATES

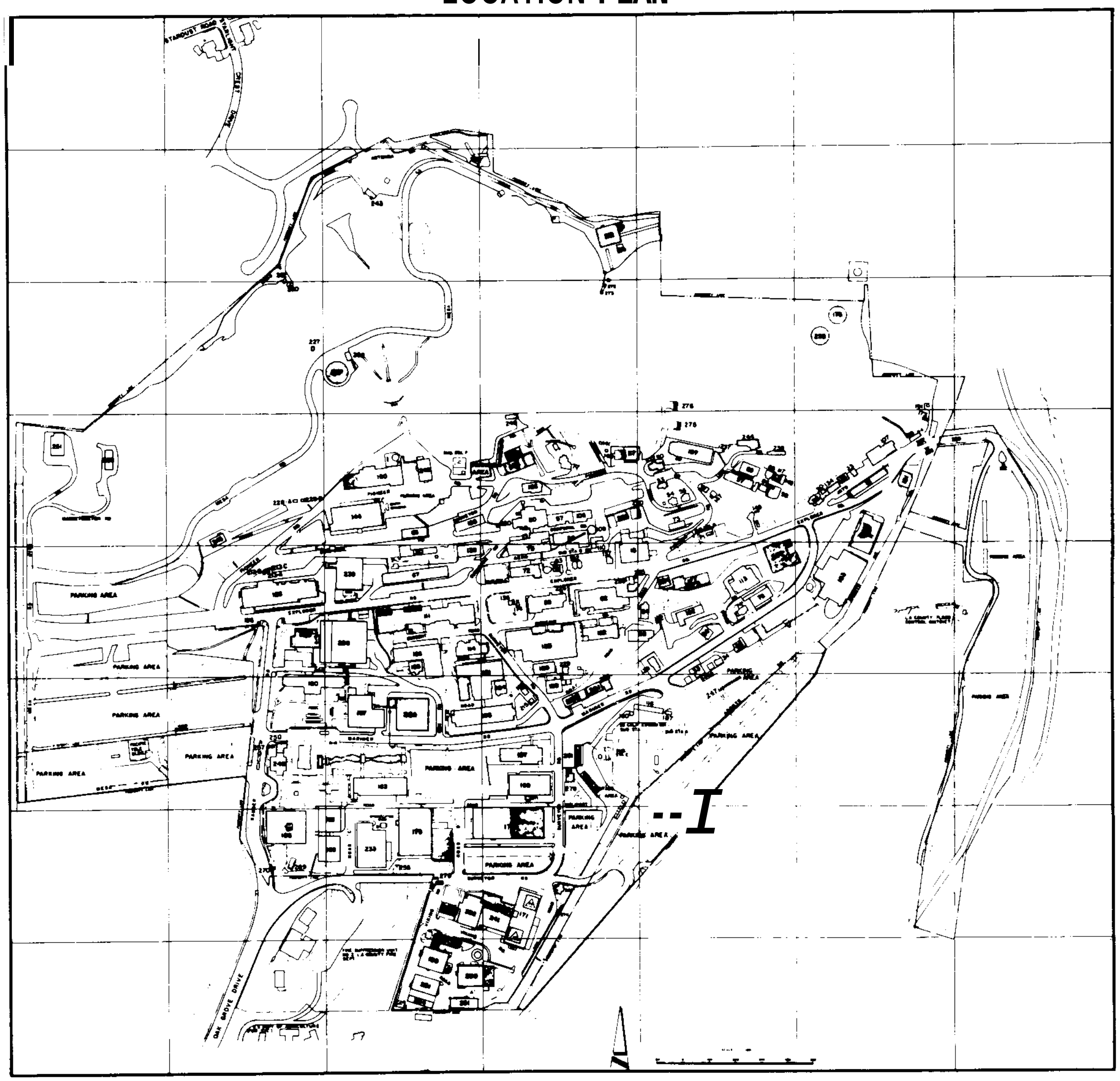


Approximate Distance to JPL From

International Airport	30 miles
Burbank Airport	15 miles
Ontario Airport	35 miles
Union Station (L.A.)	15 miles
Downtown Los Angeles	15 miles
Hollywood	20 miles
Pasadena	6 miles

GREATER LOS ANGELES AREA

JET PROPULSION LABORATORY
FISCAL YEAR ESTIMATES
LOCATION PLAN



JET PROPULSION LABORATORY

LEGEND

Bldg. No.	Title	Location
11	Space Sciences Lab	E-2
13	Offices, Lab 6 Shop	D-3
18	Structural Test lob	D-2
20	Shop Test Cell No. 2 (Liq)	D-2
23	Shop Test Cell No. 12 (Liq)	E-2
31	Test Cell (Liq)	E-?
32	Tot Cell (Liq)	D-2
33	Test Cell (Liq)	D-3
34	Shop Test Cell No. 33 (Liq)	D-3
35	Mag Flux Tank Shelter	B-1
41	Hi-Temp Lab	D-3
42	Test Ccll (Liq)	D-3
46	Shop Test Cell No. 42 (Liq)	D-3
47	Plant Protection	D-2
53	Conditioning Lab (Solid)	D-3
54	Blending Lab (Solid)	D-2
55	Miring Lab (Solid)	D-2
57	Test Cell (Air Fuel)	C-2
58	Compressor Bldg	C-2
59	Chemistry Lab	D-3
65	Materials Lab	D-3
67	Microbiology Facility	B-2
71	Mechanics Stores	D-2
72	Engineering Offices	C-2
73	Utilities Area Storage	D-2
74	Test Cell (Chemistry)	D-3
77	Soil Science Lab	C-2
78	Hydraulics Lab	D-3
79	Wind Tunnel (20 inch)	C-2
BO	Wind Tunnel (21 inch)	C-2
81	Battery Laboratory	E-2
82	Environmental Test Lab	C-2
83	Electronic Parts 6 Engineering	C-2
84	Test Cell 6 Solid Chemistry	D-2
85	Business Systems Office	C-2
86	Oxidizer Grinding (Solid)	D-2
87	Ovens (Solid)	D-2
88	Mixing lab (Solid)	D-2
89	Processing Lab (Solid)	D-2
90	Shop Test Cell No. 51	D-2
91	Air Dryer (Wind Tunnel)	C-2
92	Cooling Tower (Wind Tunnel)	C-2
93	Vaporizer (Wind Tunnel)	C-2
97	Development Lab 6 Offices	D-2
98	Preparation shop (Solid)	D-2
99	Chemistry Lab (Solid)	D-3

Bldg. No.	Title	Location
103	Fabrication Shop	E-3
106	Test Cell (Air fuel)	C-2
107	Test Cell	E-2
109	Cooling Tower (Wind Tunnel)	C-2
110	Fuel Stor Tank	C-2
111	General Offices Bldg	8-2
114	Cafeteria 6 Offices	C-3
115	Heating Plant (Solid)	D-2
116	Propellant Storage Dock	D-3
117	Test Cell (Solid)	D-2
118	Cooling Tower	C-3
120	Cooling Tower	D-2
121	Employment Development Ctr	E-2
122	Engineering Offices	C-3
125	Combined Electronics	C-3
126	Systems Div Office Bldg	B-2
129	Test Cell (Chemistry)	D-3
130	Engineering Offices	C-7
133	Service Dock	C-2
134	Shop lest Cell	E-2
135	Guard Shelter	A-2
136	Cooling Tower	C-2
137	Cooling Tower	C-1
138	Engineering Offices	C-1
140	Magazine X Temp	C-2
141	Magazine X Temp	C-2
145	Magazine Propellant	D-2
147	Cooling Tower	D-2
148	Energy Conversion Lab	C-2
150	25-ft Space Simulator	B-2
152	Hazardous Chemical Stor	C-3
156	Computer Program Office	B-3
157	Engineering 6 Mechanics Bldg	c-3
158	Material Research Proc Lab	C-3
159	Pump House (Water)	E-2
160	Sewage Lih Statim	C-3
161	Telecommunications lob	C-3
165	Cooling Tower	C-3
166	Cooling Tower	C-2
167	Cafeteria	8-3
168	Space Sciences Instrmt Sys Lab	B-3
169	Engineering Office Bldg	B-3
170	Fabrication Shop	C-3
171	Materials Service Bldg	C-4
173	Test Shelter	E-2
174	Cooling Tower	C-2
175	Water Reservoir	E-2

Bldg No	Title	Location
177	Transportation Garage	D-2
179	Spacecraft Assy Facility	B-3
180	Central Engineering Bldg	B-3
182	Bus Stop Shelter	t-2
183	Physical Science Lab	B-3
184	Electronic Stores	C-3
185	Programming Office	8-3
186	Space Sciences Div Bldg	A-3
187	Chemical Storage	D-3
188	Engineering Facilities Bldg	C-2
189	Electronics Lab - Annex	C-3
190 – 190A	Procurement Offices	B-4
191	Hazardous Test Bay	E-2
192	Propulsion Engineering	D-3
195	Guord Shelter	B-3
196	Guard Shelter	B-2
197	Solid-Propellant Process Lab	D-2
198	Guidance lob	C-3
199	Celestial Simulator Bldg	C-3
700	Plant Engineering Services	B-4
201	Carpenter Shop	B-4
202	Procurement Offices	B-4
209	Illuminator Tower	D-1
210	Blaine Truck	D-1
217	Antenna Lob	D-1
213	Cooling Tower 'A', 'B' & 'C'	8-2
218	Credit Union	8-3
220	C.R.S. Terminal Bldg	C-2
224	Sewer Lift Station	B-4
225	Guord Shelter - Meso	C-1
226	Solvent Storage Bldg	C-2
227	Guard Shelter	B-1
228	Cooling Tower (A & 8)	B-2
229	Shielded Room Bldg	C-3
230	Space Flight Operations Facility	B-2
231	Paint Shop	8-4
233	Spacecraft Development Bldg	8-3
234	Lumber Stor Bldg	B-4
237	Cooling Tower	D-2
238	Telecommunications Lab	B-2
239	Low-Temp Solid Prop Mag	D-1
241	Shipping 6 Receiving	B-4
243	Remote Antenna Range Contr	8-1
2U	Hi-Temp Stor Mag	D-2
245	Spectroscopy lab	B-2
246	Soils Test Lob	C-1
248	10-ft Space Simulator	C-2

Bldg No	Title	Location
149	Visitor Reception Bldg	[illegible]
250	Guard Shelter	B
251	Gyro Lab	A
253	Low-Mag Interference Lab	A
255	Sewage Lift Station	B-
256	Model Range Control Bldg	B-1
257	Guord Island	B-3
758	Water Reservoir	[illegible]
159	Liquid Nitrogen Bottling Stor	D-2
760	Illuminator Equipment Bldg	B-1
161	Material Storage	C-3
262	Radiometer Bldg	8-1
263	Protective Services Bldg	C-J
264	SFOF Sys Dev Lob	B-3
267	Water Reservoir	B-2
268	Pump House	B-1
269	Grounds Maintenance Bldg	C-4
770	Sewage Metering Station	A-J
271	Oil Barrel Stor	C-3
272	East Illuminator Bldg	C-1
273	East Illuminator Tower	C-1
274	Cooling Tower	C-J
775	Chemical Stor Prop Bldg	D-2
276	Chemical Stor Prop Bldg	D-2
277	Isotope Thermoelectric Lob	D-2
278	Helicopter Maint Hangar	C-3
279	Guord Island	B 3
180	Static Test Tower	D-7
281	Fireman / Guard Station	C-3
283	Metal Storage Building	C-3
784	Transportation Office Bldg	D-7
285	Arroyo Bridge	E-2
2R6	Guord Bldg, Anoya	E-2
287	Island Guard Bldg	f-2
288	Project Equipment Storage	C-2
	'A' Gate	A-3
	'8' Gate	A-1
	'C' Gate	B-2
	'D' Gate	E-2
	'E' Gotr	B 3
	'F' Gote	B-7
	'G' Gate	A-2

JET PROPULSION LABORATORY
FISCAL YEAR 1984 ESTIMATES
AERIAL VIEW

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

FISCAL YEAR 1984 ESTIMATES

SUMMARY OF AERONAUTICAL RESEARCH AND TECHNOLOGY
OFFICE OF AERONAUTICS AND SPACE TECHNOLOGY

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
	(Thousands of Dollars)			
Research and development.	264,800	232,000	280,000	300,300
Construction of facilities	22,650	20,115	20,115	24,000
Research and program management.	228,872	234,200	252,700	265,100
Total	516,322	486,315	552,815	589,400
Number of direct positions associated with aeronautical research and technology	3,753	3,764	3,739	3,740

The objectives of the Aeronautical Research and Technology program are to provide advanced technology for the increased safety, economy, efficiency and environmental acceptability of air transportation systems in response to current and projected National needs; to support the Department of Defense in maintaining the superiority of U.S. military aircraft; and to keep U.S. aviation in the forefront of the international marketplace.

The 1984 Aeronautical Research and Technology program is directed toward meeting these objectives by stressing the technology areas judged to be the most critical by both internal NASA assessments and external assessments involving industry, military, advisory groups, academia, other government agencies, and other users of the technology. Emphasis will be placed on maintaining a strong discipline oriented research and technology base supporting all classes of aircraft and on focused systems technology programs which support common military and civil aircraft needs.

In 1984, critical research and technology base activity will continue in both the fundamental disciplines and systems research areas. Emphasis in fluid and thermal physics will be applied to high-Reynolds-number cryogenic testing, turbulent drag reduction, and internal computational fluid dynamics. Areas of emphasis in materials and structures will include ceramics, new composite materials, and transport aircraft crash dynamics. In controls and human factors, additional support will be provided to two new capabilities: the Man-Vehicle Systems Research Facility at the Ames Research Center and the Avionics Integration Research Laboratory at the Langley Research Center. The upgrading of capabilities in computer science and applications will continue to receive major emphasis, with expanded efforts directed toward technology for highly reliable systems. In propulsion, emphasis will be placed on intermittent combustion engines, helicopter and turboprop transmissions, engine dynamics and stall recovery, and small radial turbomachinery. Rotorcraft research will stress noise and vibration reduction and the unsteady aerodynamics of rotors. Areas of emphasis in high-performance aircraft research will include: supersonic cruise technology, hypersonic propulsion, structures, configuration aerodynamics, and propulsion/airframe integration. In subsonic aircraft, research emphasis will be placed on commuter aircraft, icing and lightning research, natural laminar flow, and problem areas identified in coordination with the Federal Aviation Administration as critical to improved air safety and operations.

Systems technology program enhancements are planned in 1984 in several important long-lead, high-risk areas. Numerical aerodynamic simulation will significantly augment the Nation's program in computational fluid dynamics and other areas of computational physics by developing an advanced capability that will provide modern and efficient access for users nationwide for application to computational aerodynamics, computational chemistry, and other complex analytical problems. Advanced composite structures technology will address thick, load-critical primary structures representative of large aircraft wing-structure sections; curved panels to investigate fuselage design technology problems; and new-generation materials for increased toughness and impact resistance. Technology for next-generation rotorcraft will pursue further understanding relative to two high-speed rotorcraft concepts -- the tilt rotor and the Defense Advanced Research Projects Agency's X-wing.

The construction of facilities program for 1984, in support of aeronautical research and technology, includes the following major projects: modification of the Small Engine Component Test Facility and the Icing Research Tunnel at Lewis Research Center; modifications to the Composite Materials Laboratory and the 30x60 foot wind tunnel at Langley Research Center; and construction of the Fluid Mechanics Laboratory at Ames Research Center.

The research and program management funding in 1984 provides for the salaries and travel of 3,740 direct civil servants, for the utilities necessary to conduct wind tunnel operations, and for other general operation of installation costs necessary to conduct the NASA aeronautics program.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

RESEARCH AND DEVELOPMENT

ESTIMATED FY 1984 OBLIGATIONS FOR EQUIPMENT TO BE PLACED AT NASA INSTALLATIONS

Program Budget Line Item	1984 (Thousands of Dollars)
Space Flight	189,854
Space Transportation Capability Development	(172,595)
Space Transportation Operations	(17,259)
Space Science and Applications	14,764
Physics and Astronomy	(3,545)
Planetary Exploration	(59)
Life Sciences	(1,600)
Space Applications	(9,560)
Aeronautics and Space Technology	55,681
Aeronautical Research and Technology	(50,105)
Space Research and Technology	(5,576)
Tracking and Data Acquisition	20,015
GRAND TOTAL	280,314

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

SUMMARY OF MAJOR EQUIPMENT ACQUISITION OBLIGATIONS INCLUDED IN FY 19W BUDGET

PROGRAM BUDGET LINE ITEM	RECEIVING INSTALLATION, BUILDING LOCATION, AND EAD CONTROL NUMBER	EQUIPMENT DESCRIPTION	PROGRAMMATIC PURPOSE	FY 1984 OBLIGATIONS ($ IN THOUS.)	RELATED FACILITY PROJECT
Space Transportation Capability Development	Johnson Space Center, Buildings 35 and 5, 72-76-01	Guidance and Navigation Simulator (GNS)	Provides additional Univac 1100/44 computer hardware necessary to configure a host computer system for a Shuttle GNS.	500	CoF Project 9370: FY81 $400K (Phase I) FY82 $250K (Phase II) FY83 $650K (Phase III)
Space Transportation Capability Development	Johnson Space Center, Building 30, 72-77-01	Shuttle Data Processing Complex	Replaces computers that will not accommodate the Shuttle data handling requirements.	275	FY77 CoF Project 9370
Space Transportation Capability Development	Johnson Space Center, Building 30, 72-77-04	Network Interface Processor (NIP)/ Hardware	Interfaces the Orbiter Mula-Rate Data System from the Space Tracking Data Network (STDN)/ Tracking Data Relay Satellite (TDRSS).	696	
Space Transportation Capability Development	Johnson Space Center, Building 30, 72-78-01	Wide Band Recorder/ Switch	Provides capability for switching and recording all data input to the Mission Control Center.	2,119	
Space Transportation Capability Development	Johnson Space Center, Building 30, 72-78-02	Display Control/ Shuttle Data Processing Complex Interface	Provides information required by flight team, Mission Control Center team, and Network team.	2,490	

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

SUMMARY OF MAJOR EQUIPMENT ACQUISITION OBLIGATIONS INCWOED IN FY 1984 BUDGET

PROGRAM BUDGET LINE ITEU	RECEIVING INSTALLATION, BUILDING LOCATION, AND EM CONTROL NUMBER	EQUIPMENT DESCRIPTION	PROGRAMMATIC PURPOSE	FY 1984 OBLIGATIONS ($ IN THOUS.)	RELATED FACILITY PROJECT
Space Transportation Capability Development	Johnson Space Center, Building 30, 72-79-06	Hard Copy	Provides hard copy of Digital Data Display from the Shuttle Data Processing Complex.	970	
Space Transportation Capability Developent	Johnson Space Center, Building 30 , 72-79-10	Text and Graphics Systern	Interfaces the Mission Control Center to the Shuttle to transfer text graphics information.	250	
Space Transportation Capability Development	Jchnson Space Center, Building 30, 72-81-04	FRBO Microfiche Upgrade	Provides flight control mission and Shuttle Development Lab products.	675	
Space Transportation Capability Development	Johnson Space Center, Building 12, 72-82-03 (also incorporates 72-81-03)	Univac 1108 Replacement for Central Computing Facility (CCF)	Alleviates shortfall in the CCF's capability and reliability for meeting user requirements.	6,898	CoF Project 8627: FY81 $175K (Phase I) CoF Project 9226: FY83 $420K (Phase II)
Space Transportation Capability Developent	Johnson Space Canter, Building 30, Admin-istrative Wing, 72-82-04	Software Production Facility	Provides mission reconfiguration of Orbiter onboard software for use in tests, training, vehicle check-out and Shuttle mission use.	2,019	CoF Project 9370: FY81 $490K (Phase I) FYBZ $350K (Phase II)

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SUMRY OF MAJOR EQUIPMENT ACQUISITION OBLIGATIONS INCLUDED IN FY 1904 BUDGET

PROGRAM BUDGET LINE ITEM	RECEIVING INSTALLATION, BUILDING LOCATION, AND EAD CONTROL NUMBER	EQUIPMENT DESCRIPTION	PROGRAMTIC PURPOSE	FY 1904 OBLIGATIONS ($ IN THOUS.)	RELATED FACILITY PROJECT
Space Transportation Capability Development	Johnson Space Center White Sands Test Facility, 72-82-07	Data Acquisition and Control System	Maintains WSTF as a viable hazardous test facility.	1,094	
Space Transportation Capability Development	Johnson Space Center, Building 5, Mission Simulation and Training, 72-83-01	Shuttle Mission Sirnulator 3	Supports additional training required for STS crew members and flight control personnel as a result of increased rate.	46,700	FY84 CoF
Space Transportation Capability Development	Johnson Space Center, Building 4, 72-83-02	Mission Control Center (MCC) Console Trainer	Provides individual systems training of flight control personnel to augment training provided during integrated MCC/Shuttle Mission Simulator Simulations.	487	
Space Transportation Capability Development	Johnson Space Center, Buildings 12, 30, and others, 72-83-03	Institutional Communication Network, Central Computing Facility	Reduces costs over current method of computer to-terminal communications.	550	FY84 CoF

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

SUMMARY OF MAJOR EQUIPMENT ACQUISITION OBLIGATIONS INCLUDED IN FY 1984 BUDGET

PROGRAM BUDGET LINE ITEM	RECEIVING INSTALLATION, BUILDING LOCATION, AND EAD CONTROL NUMBER	EQUIPMENT DESCRIPTION	PROGRAMMATIC PURPOSE	FY 1984 OBLIGATIONS ($ IN THOUS.)	RELATED FACILITY PROJECT
Space Transportation Capability Developent	Johnson Space Center, Building 4, 72-84-01	Crew Activity Planning System (CAPS II)	Provides higher speed for processing documents when Shuttle flight rates exceed 10 per year.	965	
Space Transportation Capability Development	Johnson Space Center, Buildings 12 and 30, 72-84-02	Replacement and Refurbishment	Replaces obsolete microform and telemetry processing equipment.	1,400	
Space Transportation Capability Development	Johnson Space Center, Building 5, 72-84-03	Shuttle Mission Simulator Equipment Refurbishment Replacement	Replaces obsolete equipment related to the SMS host computer.	1,863	FY86 CoF
Space Transportation Capability Development	Johnson Space Center, Building 30, 72-84-04	Reconfiguration Data Management System	Provides combined application support for reconfiguration, logistics, and nonreal-time computer support.	2,650	Included in FY83 MCRR program
Space Transportation Capability Development	Johnson Space Center, Building 5, 72-84-05	Motion Base Aft Station (MBAS)	Provides additional on-orbit training capability required to support the increasing flight rate of Shuttle operations.	8,877	Included in FY82 MCRR project 2206.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

SUMMARY OF MAJOR EQUIPMENT ACQUISITION OBLIGATIONS INCLUDED IN FY 1984 BUDGET

PROGRAM BUDGET LINE ITEM	RECEIVING INSTALLATION, BUILDING LOCATION, AND EAD CONTROL NUMBER	EQUIPMENT DESCRIPTION	PROGRAMMATIC PURPOSE	FY 1984 OBLIGATIONS ($ IN THOUS.)	RELATED FACILITY PROJECT
Space Transportation Capability Development	Johnson Space Center, Building 30, 72-84-06	Card Tester	Repairs digital logic cords outside of on-line equipment.	515	
Space Transportation Capability Development	Johnson Space Center, Various buildings on-and off-site, 72-84-07	Intelligent Work Stations	Off-load Central Computing Facility (CCF) computer workload and serve as interfaces to computers to increase user productivity.	500	
Space Transportation Capability Development	Kennedy Space Center, Vehicle Assembly Building, 76-82-01	Multi-Mission Support Equipment (MMSE) Seccnd Set	Transports payloads from payload processing facilities to Orbiter Processing Facility to Pad and return.	1,637	
Space Transportation Capability Development	Kennedy Space Center, Pad B, 76-82-03	Operational Television (OTV) System	Provides remote viewing and recsrding of operations of equipment at the launch pad, which may be inaccessible or too hazardous for on-the-scene observation.	1,738	

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

SUMMARY OF MAJOR EQUIPMENT ACQUISITION OBLIGATIONS INCLUDED IN FY 1984 BUDGET

PROGRAM BUDGET LIYE ITEM	RECEIVING INSTALLATION, BUILDING LOCATION, AND EAD CONTROL NUMBER	EQUIPMENT DESCRIPTION	PROGRAMMATIC PURPOSE	FY 1904 OBLIGATIONS ($ IN THOUS.)	RELATED FACILITY PROJECT
Space Transportation Capability Development	Kennedy Space Center, Mobile Launch Pad 2, 76-82-04	Radioisotope Thermoelectric Generator (RTG) Cooling Unit	Provides coolant fluid at required rates to RTG's to be utilized on some payloads.	945	
Space Transportation Capability Development	Kennedy Space Center, Pad B, 76-82-06	Payload Ground Handling Mechanism	Removes and installs payload into the Shuttle vehicle at the launch pad.	1,654	
Space Transportation Capability Development	Kennedy Space Center, Central Instrumentation Facility, 76-82-07	Shuttle Inventory Management Systea (SIMS) II	Supports USAF and NASA logistic functions for the space Transportation System (STS).	3,495	
Space Transportation Capability Development	Kennedy Space Center, Mobile Launch Pad 3, 76-82-08	Permanent Measuring System	Provides €or measuring and recording critical data for MLP-3 during launch and stacking activity.	1,047	
Space Transportation Capability Development	Kennedy Space Center, Launch Complex 39, 76-83-01	Launch Processing System/Software Production Facility	Supports the mission model reaching 24 missions per year, 2 per month.	341	

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SUMMARY OF MAJOR EQUIPMENT ACQUISITION OBLIGATIONS INCLUDED IN FY 1984 BUDGET

PROGRAM BUDGET LINE ITEM	RECEIVING INSTALLATION, BUILDING LOCATION, AND EAD CONTROL NUMBER	EQUIPHENT DESCRIPTION	PROGRAMMATIC PURPOSE	FY 1984 OBLIGATIONS ($ IN THOUS.)	RELATED FACILITY PROJECT
Space Transportation Capability Development	Kennedy Space Center, Mobile Launch Pad 3, 76-83-02	Tail Service Mast System	Integral part of MLP3 for support and protection of Orbiter at launch.	1,321	
Space Transportation Capability Development	Kennedy Space Center, Pad B, 76-83-03	Pad Fuel Cell Servicing System	Services the Orbiter Fuel Cell System with cryogenic fuels.	2,359	
Space Transportation Capability Development	Kennedy Space Center, Pad B, 76-83-04	Hypergol Thermal Conditioning Units	Maintains hypergolic fluid at a nominal 70°F during fluid flow of Shuttle loading/deloading operations.	218	
Space Transportation Capability Development	Kennedy Space Center, Solid Rocket Booster (SRB Processing/ Storage Facility, 76-84-01	Solid Rocket Motor (SRM) Facility Transporter #2	Transports SRM's within the facility and to the vehicle Assembly Building (VAB).	1,322	
Space Transportation Capability Development	Kennedy Space Center, SRB Processing/Storage facility, 76-84-02	Solid Rocket Motor (SRM) 4-Point Beam	Stacks and adjusts "roundness" of SRB's during mating operation; eliminates the need to procure several additional end rings.	300	

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SUMMARY OF MAJOR EQUIPMENT ACQUISITION OBLIGATIONS INCLUDED IN FY 1984 BUDGET

PROGRAM BUDGET LINE, ITEM	RECEIVING INSTALLATION, BUILDING LOCATION, AND EAD CONTRGL NUMBER	EQUIPMENT DESCRIPTION	PROGRAMMATIC PURPOSE	FY 1984 OBLIGATIONS ($ IN THOUS.)	RELATED FACILITY PROJECT
Space Transportation Capability Developnent	Kennedy Space Center, Mobile Launch Pad 3, 76-84-03	Hazardous Gas Detection System	Measures concentrations of hazardous gases internal to purged Orbiter and Ground Support Equipment structure cavities.	773	
Space Transportation Capability Development	Kennedy Space Center, Pad B, 76-84-04	Orbiter Access Arm Chamber	Provides crew compart-ment access and adjacent work area through the inflatable weather seal to the Shuttle vehicle.	292	
Space Transportation Capability Developent	Marshall Space Flight Center, Slidell Computer Complex, 62-84-05	External Tank High-speed Storage Augmentation	High speed storage devices that reduce risk of single point failure in the U-1100/60 computer system.	321	
Space Transportation Capability Developent	Marshall Space Flight Center, Slidell Computer Complex, 62-84-06	High-Speed Storage Repiacement	Stores and retrieves large volumes of data at a very high rate of speed.	1,388	

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SUMMARY OF MAJOR EQUIPMENT ACQUISITION OBLIGATIONS INCLUDED IN FY 1984 BUDGET

PROGRAM BUDGET LINE ITEM	RECEIVING INSTALLATION, BUILDING LOCATION, AND EAD CONTROL NUMBER	EQUIPMENT DESCRIPTION	PROGRAMMATIC PURPOSE	FY 1984 OBLIGATIONS ($ IN THOUS.)	RELATED FACILITY PROJECT
Space Transportation Capability Developent	Marshall Space Flight Center, Slidell Computer Complex, 62-84-07	U-8450 Disc Upgrade	Provides storage in support of MSFC Shuttle programs and Slidell Computer Complex users.	612	
Space Transportation Capability Developent	Marshall Space Flight Center, Slidell Computer Complex, 62-84-08	Communications/Symbiont Processor Replacement	Provides distributive communications for expanded remote terminal support.	324	
Space Transportation Operations	Marshall Space Flight Center, Building 4663, 62-84-01	Univac 1100/82	Supports major ADP requirements and provides program support.	1,037	
Space Transportation Operations	Marshall Space Flight Center, Slidell Computer Complex, 62-84-02	U-1100/60 Augmentation	Processes computing requirements of MSFC, Michoud, KSC, and other agencies.	378	
Space Transportation Operations	Marshall Space Flight Center, Slidell Computer Complex, 62-84-03	External Tank Production Terminal Augmentation	Interactive terminal network necessary to meet Shuttle external tank production schedules.	463	

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SUMMARY OF UAJOR EQUIPMENT ACQUISITION OBLIGATIONS INCLUDED IN FY 1984 BUDGET

PROGRAM BUDGET LINE ITEM	RECEIVING INSTALLATION, BUILDING LOCATION, AND EAD CONTROL NUMBER	EQUIPMENT DESCRIPTION	PROGRAMMATIC PURPOSE	FY 1984 OBLIGATIONS ($ IN THOUS.)	RELATED FACILITY PROJECT
Space Transportation Operations	Marshall Space Flight Center, Building 4663, 62-84-04	Ground Station Replacement	Ensures capability to support data reduction requirements; Shuttle and Spacelah require additional capability to meet higher data rates and timelines.	500	
Physics and Astronomy	Goddard Space Flight Center, Science and Applications Computing Center (SACC), 51-81-01	SACC Upgrade	Replaces SACC equipment with new computer system that will include an on-line mass storage device to meet OSSA program requirements.	3,100	
Physics and Astronomy	Goddard Space Flight Center, 51-84-01	Cobe Project Space-craft Ground Support System	Provides science data processing and space-craft operational planning (Cosmic Background Explorer).	360	

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

SUMMARY OF MAJOR EQUIPMENT ACQUISITION OBLIGATIONS INCLUDED IN FY 1984 BUDGET

PROGRAM BUDGET LINE ITEM	RECEIVING INSTALLATION, BUILDING LOCATION, AND EAD CONTROL NUMBER	EQUIPMENT DESCRIPTION	PROGRAMMATIC PURPOSE	FY 1984 OBLIGATIONS ($ IN THOUS.)	RELATED FACILITY PROJECT
Space Applications	Goddard Space Flight Center, Building 22, 51-82-10	Goddard Modeling Activity Advance Computer System	Supplants and extends capability of existing Amdahl 470V/6 used in atmospheric sounding retrieval, data assembly, atmospheric modeling, numerical forecast development in support of Global Atmospheric Research Program (GARP) and NASA Climate Research Program.	8,040	
Aeronautical Research and Technology	Ames-Dryden Flight Research Facility, Building 4801/Simulation/RPRV Facility, 21-83-03	Simulation and RPRV Computer System	Provides requirements for simulation and augmentation system for remote piloted research vehicles.	1,700	
Aeronautical Research and Technology	Ames-Dryden Flight Research Facility, Building 4820, Flight Loads Research Facility, 21-83-04	Refurbishment and Upgrading the Thermal and Mechanical Loads Control System	Provides the capability of performing thermal and mechanical load test on aircraft and components of aircraft.	620	
Aeronautical Research and Technology	Ames-Dryden Flight Research Facility, Building 4838, Data Analysis Facility, 21-83-05	Central Computer Replacement	Ensures the capability of analyzing flight research data at Dryden through the 1980's.	2,500	

NATIONAL AERONAUTICS AN3 SPACE ADHINISTRATION

SUMMARY OF MAJOR EQUIPHENT ACQUISITION OBLIGATIONS INCLUDED IN FY 1984 BUDGET

PROGRAM BUDGET LINE ITEU	RECEIVING INSTALLATION, BUILDING LOCATION, AND EAD CONTROL NUMBER	EQUIPMENT DESCRIPTION	PROGRAMMATIC PURPOSE	FY 1984 OBLIGATIONS ($ IN THOUS.)	RELATED FACILITY PROJECT
Aeronautical Research and Technology	Ames Research Center, Dryden Flight Research Facility Hangar, 21-84-01	Airplane	Replaces the outdated C-47 program support airplane. Used for logistics and program support at Dryden and Ames and as a chase airplane for selected research programs.	2,000	
Aeronautical Research and Technology	Ames-Dryden Flight Research Facility, Building 4800, Calibration and Environmental Test Facility, 21-84-02	Calibration Information Hanagement Syatem	Provides for laboratory calibrations, onboard vehicle calibrations, calibration processing and a calibration data base.	400	
Aeronautical Research and Technology	Ames Research Center, NAS Facility, 21-84-03	Numerical Aerodynamic Simulator (NAS)	Provides a large scale, high performance computational resource for solving three dimensional, viscous fluid flow equations specially oriented toward the solution of aerodynamic and fluid dynamic problems.	13,500	

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SUMMARY OF MAJOR EQUIPMENT ACQUISITION OBLIGATIONS INCLUDED IN FY 1984 BUDGET

PROGRAM BUDGET LINE ITEM	RECEIVING INSTALLATION, BUILDING LOCATION, AND EAD CONTROL NUMBER	EQUIPMENT DESCRIPTION	PROGRAMTIC PURPOSE	FY 1984 OBLIGATIONS ($ IN THOUS.)	RELATED FACILITY PROJECT
Aeronautical Research and Technology	Ames Research Center, Building 221B, 80x120-Foot Wind Tunnel, 21-84-04	Realtime Executive Processor (REP)	Provides the majority of near-time processing, machine-to-machine control, experimental and tunnel parameter control, off-line processing and data communications, as well as user communication.	550	
Aeronautical Research and Technology	Lewis Research Center, HPF or other high pressure turbine testing facility, 22-84-01	Laser Anemometry System for Warm Turbine	Uses turbulence and velocity measurements to develop viscous flow dynamic routines.	250	
Aeronautical Research and Technology	Lewis Research Center, Building 49, 22-84-02	High Temperature Structures Laboratory	Provides state-of-the-art capabilities in structural analysis of components undergoing elastoplastic behavior in current and future turbine engines.	400	

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

SUMMARY OF MAJOR EQUIPMENT ACQUISITION OBLIGATIONS INCLUDED IN FY 1984 BUDGET

PROGRAM BUDGET LINE ITEM	RECEIVING INSTALLATION, BUILDING LOCATION, AND EAD CONTROL NUMBER	EQUIPHENT DESCRIPTION	PROGRAMMATIC PURPOSE	FY 1984 OBLIGATIONS ($ IN THOUS.)	RELATED FACILITY PROJECT
Aeronautical Research and Technology	Levis Research Center, Building 142, 22-84-03	TRADAH III	Offers on-line playback of selected calculations necessary to verify the quality of data the system is recording, such as frequency data from rocket engines experiments and gas turbine combustion and acoustics experiments. System serves over 20 test facilities.	1,150	
Aeronautical Research and Technology	Lewis Research Center, Building 142, 22-84-04	Graphics Computer System	Provides the results of the large and complex computer models of physical phenomenon in graphic form.	2,000	
Aeronautical Research and Technology	Lewis Research Center, Building 142, 22-84-05	Mass Storage Device	Provides low-cost intermediate data storage facilities for the large volumes of experimental test data and analytical data being generated constantly in the large number of research projects conducted at Lewis.	1,000	

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

SUMMARY OF MAJOR EQUIPMENT ACQUISITION ABLIGATIONS INCLUDED IN FY 1984 BUDGET

PROGRAM BUDGET LINE ITEM	RECEIVING INSTALLATION, BUILDING LOCATIONS, AND EAD CONTROL NUMBER	EQUIPHENT DESCRIPTION	PROGRAMMATIC PURPOSE	FY 1984 OBLIGATIONS ($ IN THOUS.)	RELATED FACILITY PROJECT
Aeronautical Research and Technology	Lewis Research Center, Building 142, 22-84-06	Univac 1100/42 Replacement System	Replaces Univac 1100/42, which is no longer cost effective to use.	3,000	
Aeronautical Research and Technology	Lewis Research Center, Building 49, 22-84-07	High Pressure Hydraulic System for Multiaxial Fatigue Laboratory	Provides power for closed-loop servo-controlled computer controlled test machinery in Fatigue Laboratory.	150	
Tracking and Data Acquisition	Goddard Space Flight Center, Building 14, si-80-02	Project Operations Control Center (POCC) Pilot Model	Supports mission control workload.	400	
Tracking and Data Acquisition	Goddard Space Flight Center, Building 14, 51-80-04	Space Telescope Operations Control Center	Required to conduct real-time operation of Space Telescope space-craft.	2,600	
Tracking and Data Acquisition	Goddard Space Flight Center, Building 23, 51-81-01A	Spacelab Data Capture systen	Supports future Space-lab missions.	1,400	
Trackhng and Data Acquisition	Goddard Space Flight Center, Building 23, 51-82-04	Univac 1100/82 Computer and Peripherals	Spacelab output processor.	900	

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

SUMMARY OF MAJOR EQUIPMENT ACQUISITION OBLIGATIONS INCLUDED IN FY 1984 BUDGET

PROGRAM BUDGET LINE ITEM	RECEIVING INSTALLATION, BUILDING LOCATION, AND EAD CONTROL NUMBER	EQUIPMENT DESCRIPTION	PROGRAMMATIC PURPOSE	FY 1984 OBLIGATIONS ($ IN THOUS.)	RELATED FACILITY PROJECT
Tracking and Data Acquisition	Goddard Space Flight Center, Building 14, 51-82-05	Flight Dynamics System	Provides mission analysis and attitude computing for POCC's.	1,200	
Tracking and Data Acquisition	Goddard Space Flight Center, Building 14, 51-82-06	Command Management System	Provides computing capability for POCC's.	1,300	
Tracking and Data Acquisition	Goddard Space Flight Center, Building 14, 51-82-07	Orbit Computation System	Provides mission operations orbit computing support.	3,800	
Tracking and Data Acquisition	Goddard Space Flight Center, Building 23, 51-82-09	Computer and Special Data Capture Equipment	Provides a capability to account for packetized data from Space Telescope.	1,100	
Tracking and Data Acquisition	Goddard Space Flight Center, Building 3/14, 51-84-02	Multi-Satellite Operations Control Center (MSOCC-I) Upgrade	Upgrades real-time operations capability for supporting multiple spacecraft in the Control Center.	500	
Tracking and Data Acquisition	Goddard Space Flight Center, Building 23, 51-84-03	Gamma Ray Observatory (GRO) Data Capture system	Captures science data from the GRO spacecraft.	3,000	

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

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Tracking and Data Acquisition	Goddard Space Flight Center, Building 3/14, 51-84-04	Gama Ray Observatory (GRO) Mission Control System	Monitors and controls the GRO spacecraft.	500	
Tracking and Data Acquisition	Goddard Space Flight Center, Building 3/14, 51-84-05	Varian 77 Replacements in Network Control Center (NCC)	Front end processor for U-1100/82 system to support Tracking and Data Relay Satellite System (TDRSS)	2,000	
Tracking and Data Acquiaition	Goddard Space Flight Center, Building 3/14, 51-81-06	Univac 1100/82 leased system in the Network Control Center (NCC).	Supports operational NCC for TDRSS.	1,315	

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

FISCAL YEAR 1984 ESTIMATES

SUMMARY OF CONSULTING SERVICES ESTIMATES

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
	(Thousands of Dollars)			
Research and Program Management				
Consultants Employed by NASA............	500	650	650	650
Contractual Services....................	186	550	550	550
Subtotal.............................	686	1,200	1,200	1,200
Research and Development				
contractual Services....................	2,318	4,400	4,400	4,400
Total, NASA..........................	3,004	5,600	5,600	5,600

NASA uses paid consultants and consulting services contracts to provide advice and expert input in addition to or beyond that available from its in-house, civil service workforce. Management controls are established which assure that before entering into either a consultant services arrangement with an individual or a consulting services contract, there is ample justification presented and the action is approved at top management levels. The use to which these services will be put is as follows:

RESEARCH AND PROGRAM MANAGEMENT

	1982 Actual	1983 Budget Estimate	1983 Current Estimate	1984 Budget Estimate
	(Thousands of Dollars)			
Consultants Employed by NASA............	500	650	650	650

NASA hires experts and consultants for a variety of reasons, chiefly to provide expert advice and input on the selection of experiments for future space missions. The use of outsiders, in addition to NASA civil service personnel, provides the agency with an independent view that assures that selections represent those experiments likely to have the greatest scientific merit. Other individuals are employed to provide independent looks at technical and functional problems in order to give top management the widest possible range of views before making major decisions.

Consultant Services.....................	186	550	550	550

NASA contracts with consulting services firms for studies of functional processes on a selected basis. In 1984 these studies are needed to provide independent assessment and expertise in such areas as ADP, EEO and utility rate validation.

RESEARCH AND DEVELOPMENT

contractual Services....................	2,318	4,400	4,400	4,400
Future Program Evaluation..				2,600

In consonance with its legislative charter, NASA seeks to use advice from many sources in the private sector on what would be the most productive future programs to assure that before any problem on project is presented to the President or the Congress for approval, the widest review of that programmatic thrust is available. In addition, some funds are required to provide external expertise and input into organizational decisions, and evaluation of program effectiveness. In 1984, the largest portion of the funds will be used to support analyses conducted by the National Academy of Sciences in the Space Science and Applications, and Aeronautics and Space Technology program areas.

	1984 Budget Estimate (Thousands of Dollars)
Studies of Future Operational Modes	1,450

These funds will provide for the contractual support of studies of future organizational structures to assure independent evaluation of the various options developed.

Other Consulting Studies	350

From time to time the use of outside consultant firms provides a valuable input to decision making. These studies are in the area of management structure, and program evaluation and effectiveness. The specific studies are not defined in advance, but are approved based on demonstrated need.

FISCAL YEAR 1984 BUDGET ESTIMATES